..THE IRON AGE..

NEW YORK, NOVEMBER 12, 1931

ESTABLISHED 1855

VOL. 128, No. 20

OUTPUT REGULARIZED DESPITE FLUCTUATING DEMANDS

MANY manufacturers are faced with the problem of maintaining continuous operations on products for which there is only an intermittent or seasonal demand. To avoid the necessity of sharp fluctuations in plant activity to meet an uneven outflow of its products, the Diamond Chain & Mfg. Co., Indianapolis, has devised a production control system that aims to regularize output. Sales, production and purchasing departments coordinate in preparing advance schedules that will take care of anticipated business without undue danger of overstocking or understocking. The plan, as carried out and described in this article, has enabled the company to reduce production costs, improve the quality of its products and insure prompt deliveries to customers.

By G. E. SCHLOOT

Production Manager, Diamond Chain & Mfg. Co., Indianapolis

A PROMINENT industrial engineer defines production control as "a means whereby the details in connection with production can be planned in advance and efficiently dispatched, each machine or gang enabled to work with reference to every other machine and gang, the shop management enabled through advance knowledge to provide the necessary elements of materials, machines, tools and drawings."

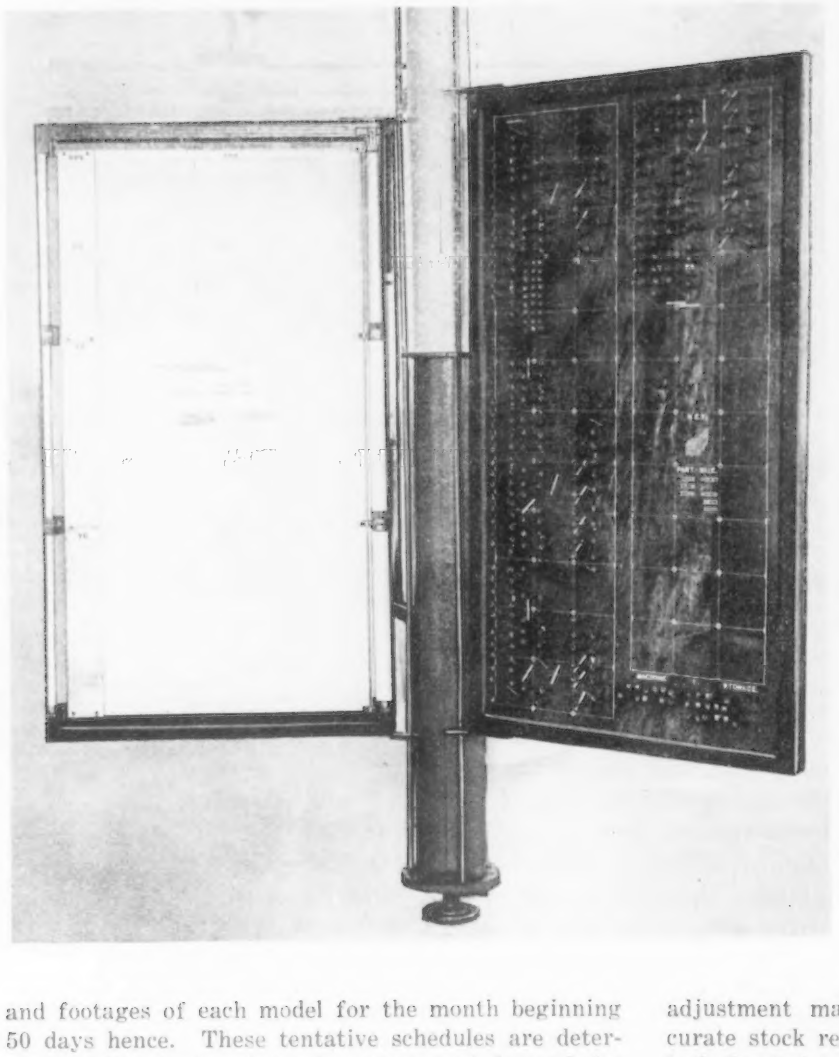
Such a program has been adopted by the Diamond Chain & Mfg. Co., Indianapolis, to handle its production problem. The plan described in this article is designed to control the manufacture of chain products, for which the demand is intermittent. The models are made for stock, and the sales and production departments are responsible for the inventories carried.

Realizing the benefits derived from employing a uniform labor force, our company has taken steps to establish uniform production rates for prolonged periods. Our entire line of chain products has been classified into various groups, each composed of models similar in nature and requiring approximately the same number of labor hours to make. A standard rate of output is determined for each group based on the demand for the individual models comprising that group. In this manner some of the advantages of continuous production by model are obtained.

Tentative Schedules Are First Set Up

After standard group production rates have been set, the first problem is to decide what to make. This can best be done by the sales, production and purchasing departments. The sales department can determine what it needs, the purchasing department what materials it will be able to furnish, and the planning department what the shop can best build.

Accordingly, on the tenth of each month the sales and production divisions make out a list of models



CONTROL boards are used by machine control man for scheduling work on machines. One side serves as layout of departments, each machine being represented by half-inch cube pinned to the board. Second side of board is used as a machine load.

(Opposite page) On control sheet the index sheet at extreme left lists individual machines in various departments. Each vertical ruling represents a calendar day, each horizontal ruling a machine listed on index sheet. On both sides of board are wooden spools mounted in bearings and carrying rolls of tracing vellum paper. Across top of each vellum sheet the calendar days are numbered from left to right. Permanently located silk line extends from top to bottom of board. Each day the vellum is moved one space from right to left so that line representing current day appears under silk cord.

and footages of each model for the month beginning 50 days hence. These tentative schedules are determined after study of the inventory and demand for each item has been made. The scheduled quantities of the various models within each group must equal the production rate previously established as standard. This list of models, together with the respective quantities, becomes a "suggested shop order." It is analyzed by the purchasing department for materials and by the production department to determine whether the quantities desired exceed the machine tool and personnel possibilities and whether the combinations lend themselves to economical production.

This analysis must be thorough, because after the "suggested shop order" actually is accepted, it becomes the production department's responsibility to deliver the items within the period specified. After the "suggested shop order" has been revised to the satisfaction of the sales, purchasing and production departments, it is rewritten as final. Following the receipt of the final shop order, the production department calculates the quantity of raw material necessary to complete the order and the requirements are forwarded to the purchasing department in the form of an order to purchase the stock.

As material is received from vendors, each item is given a shipment number and is tested both for physical and chemical qualities, the results being compared with standard specifications. Perpetual inventory cards are carried by shipments and the records adjusted as each test is completed. This method of adjustment makes possible the maintenance of accurate stock records without the necessity of periodical physical inventories.

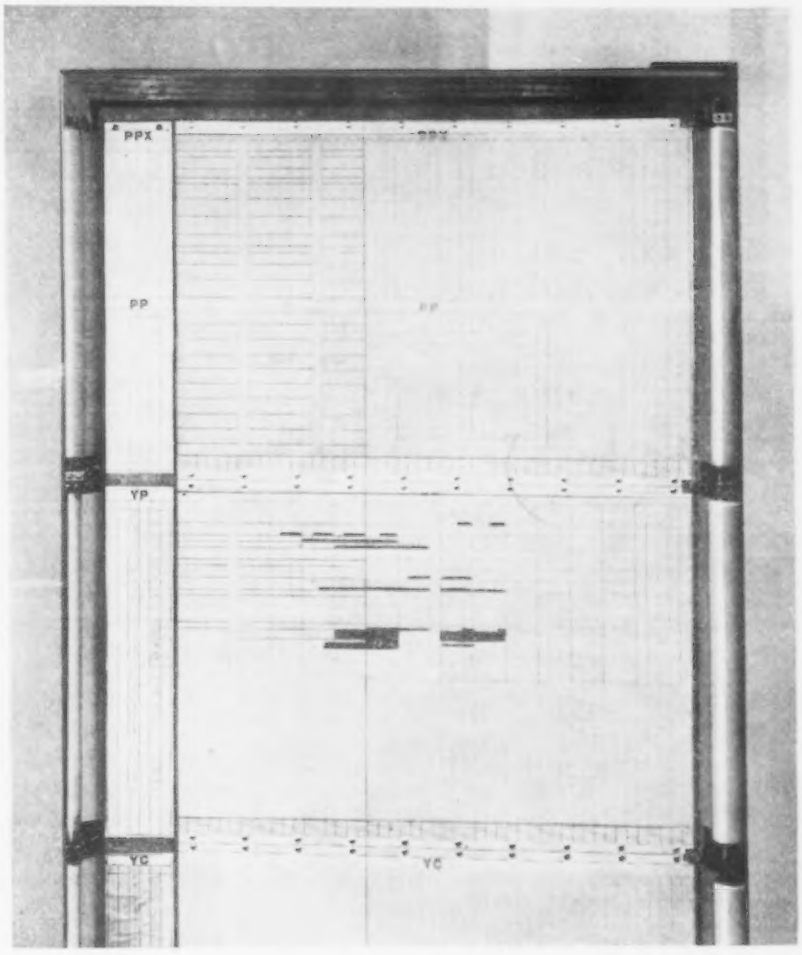
Perpetual Inventory System an Aid

Another advantage is the fact that the perpetual inventory system allows the identity of the stock to be maintained from the time it leaves the raw stores department until it is completely fabricated, so that any difficulty in heat treating parts can be readily traced and, if necessary, the troublesome material segregated. On account of the rigid inspection of incoming materials, it seldom becomes essential to discard entire shipments after they are partly processed. With the variation in analyses and physical properties of steel coming from the mills, however, it is not unusual for a lot to require a different hardening procedure from standard. It is in such cases that the benefits of maintaining shipment identities in storing and processing are realized.

While actual buying of materials rests with the purchasing department, the planning department is in nowise released from its responsibility for seeing that raw stock is on hand at the time it is needed.

Machine tools, as well as raw materials, must be available in sufficient quantities at the proper time; therefore, control of tools is an essential function of the production department. A record of all tools is kept on a "tool inventory sheet," which not only serves as a perpetual inventory, but also provides such data as are necessary in ordering tools. It shows (1) tool

life, (2) chains or parts made with the tool, (3) chain schedule, (4) perpetual inventory, and (5) quantity on order.



Tool Inventory an Important Factor

The following steps are taken in providing the tools necessary to fabricate a shop order:

List schedule of each chain using the tool.

Total of above schedules.

Extension of total schedule in terms of tool life determines number of tools necessary to complete schedule.

Determination of additional tools required over those in stores, in process and on order.

Follow-up to insure delivery. Tools made in the company's own machine shop are dispatched by the planning department in the same manner as regular production in the shop proper.

It should be noted that the inventory of tools is the total of those in stores and in use. The ordering of tools per schedule permits the inventory to fluctuate with the schedule, and in cases of reduced schedules or the closing out of certain models allows the inventory to be reduced accordingly.

After provision has been made for tools and materials, the next step is to plan and dispatch the shop order. The first thing to do is to decide the order and dates of assembly of the various lots of chain to be manufactured. In view of the fact that this program determines the order of making component parts of the assemblies, it must be undertaken with precision.

An ideal assembly schedule is one requiring a constant labor supply and machine load in the manufacturing departments and incidentally does not set up any condition which cannot be overcome. In other words, it is an arrangement of the work which permits the shop order to be delivered on time with a minimum of effort and expense. The main factors to be considered are:

Machine capacities
Available tools
Fewest possible machine setups
Available labor
Uniform demand on labor in all departments
Uniform output scheduled by groups and totals in accordance with standard production rate
Early production of low inventory models

Since parts are made and chain assembled in standard lot sizes which may or may not equal a day's quota, the rate of planned assemblies is kept in balance by maintaining the cumulative amount scheduled equal to the cumulative quota. While the arrangement of an assembly program as outlined might seem difficult, the planning division soon learns where "the neck of the bottle" is located and therefore can avoid congestion. Desirable combinations are developed so that the knack of visualizing the entire situation is soon acquired.

Control Sheet Coordinates Assembly

The next step is to find out what parts are to be made and the dates when the operations on each part are to be completed. This is done by means of a control sheet, which is filled in for each lot of chain to be assembled. The vertical spaces on the sheet are for a record of one day's processing time. With the finishing date (as shown on the assembly schedule) as the starting point, the work is traced backward through assembly, allowing sufficient time to perform the different operations. The day before assembly is to start, the component parts must be finished.

Then the work is traced back through the various fabricating processes, with the department planner laying off for each operation as many vertical spaces to the left of the succeeding operation as the latter requires days to perform. At the top of the sheet the planner starts with the assembly finishing date and puts down the working calendar days as far back as operations show on the sheet. The completion date of any operation corresponds to the date shown in the same vertical space above. It is readily seen that in case each operation is finished on time there need be no fear that the schedule will not be met.

Work in process is reduced to a minimum by keeping parts out of production until the item is actually needed. As various operations are completed, a line is drawn through the symbol so that the control sheet

Form 403 4M 9-31-22
Diamond Chain and Mfg. Co.

Chains and Length 100 ch. 10' — **MINIATURE CONTROL SHEET** — Chain No. X5235

Total Footage 1000' — Promised 5-16-24 — Job No. 05 — Lot No. 05

	5-2	3	5	6	7	8	9	10	12	13	14	15	16
0233 11			C8	G1	C7	H1	F6	C6	HP				
0233 11						F7	G2	C10H	HP				
5235 05	C8	G1		D2	C7	H1	D1	G2	HP				
1833 16					B5		B17	H7C5	HP				
2833 16					B6		B17	H7C5	HP				
A5233										B9	A2		
A9233										B9	A2		
A8233										B5	A2		
X5235											A2P6A4R3B7I1L5Re		

WHAT parts are to be made and dates various operations on each part are to be finished are determined on control sheet made out for each lot of chain to be assembled. Vertical spaces represent a day's processing time. With finishing date shown on assembly schedule as starting point, one must work backwards through assembly, allowing sufficient time to determine different operations.

shows the status of jobs at all times in addition to due dates.

For each lot of parts, a material requisition and "follower" tag are made up. Dates shown on the control sheet are written on the tracer tags and the paper turned over to the machine control man for dispatching (scheduling on the machines). As an aid in this task, machine control boards are used.

Machine Control Board Supervises Operations

A board is provided for each floor in the factory. One side serves as a layout of the departments, each machine being represented by a ½-in. cube pinned to the board. On the faces of the cubes are posted different symbols conveying such information as the operation that the machine will perform, class of work equipped for, and limitations of machine relative to size of work. The second side of the board is used as a machine load, at the left of which is carried the index sheet listing the individual machines in the various departments. Across the face of the board is tacked a sheet ruled vertically and horizontally.

Each vertical ruling represents a calendar day and each of the horizontal rules represents a machine listed on the index sheet. On both sides of the board are wooden spools mounted in bearings and carrying rolls of tracing vellum paper. Across the top of each vellum sheet the calendar days are numbered from left to right. A permanently located silk line extends from the top to the bottom of the board. Each day the vellum is moved one space from right to left so that the line representing the current day appears under the silk cord. The boards are suspended by cables, are counterbalanced and can be raised or lowered to any desired position. They are free to turn about on their main support with a range of 20 deg. The main support, however, is pivoted so that the entire system is free to revolve in a complete circle.

On receiving tracer tags with operation due dates, the machine control man determines on what machine or machines the part is to be run and when it is to be run. Under no circumstances should this date be later than that appearing on the "follower." Having decided when and where the lot is to be run, he posts on the vellum sheet opposite the machine or machines selected and under the date shown at the top of the sheet the following data: part and lot, quantity, standard hours required and the operation. He draws a horizontal yellow line from the finishing date to the left, a distance equal to the hours necessary to do the job. This line serves a dual purpose: to show the hours which are taken up and therefore are not available for other work, and when the job should be started in order to complete it on time. The paper then is filed by part number until needed.

Prior to the time when the job is to begin, the schedule man takes the paper from the file and sends the requisition and follower tag to the stores room for the material. At the same time a machine change order and gage requisition are made out, the former

Form No. 32 — **MATERIAL REQUISITION** — Diamond Chain & Mfg. Co.

Operator's Name			Clock No.	Date	Job No.
					11
For Part No.	Date Due	Board Units	Lot No.		
0233	5-3		0233-11		
Dept. No.	Mach. No.	Deliver to Dept.	Deliver to Mach.	Amt. Rej. / Amt. Acp.	Price
HR		PS	R		
Description			Quantity	Total Delivered	Value
.238 N1.			300		
			Shipment No.		Burden
			8651		

Prod. Dept. By	Prod. Dept. Date	Stores Dept. By	Stores Dept. Date	Bin No.	Time Started	Time Finished

Material requisition is made out for each lot of parts.

PERPETUAL inventory record of parts in stock is kept on "stock ledger" cards.

FORM 878 — DIAMOND CHAIN & MFG. CO.

STOCK LEDGER

PART ____ KIND ____

DESCRIP. ____ BIN No. ____ SIZE ____

DATE REC'D	QUANTITY REC'D	SHIP. No.	DATE ISSUED	QUANTITY ISSUED	ISSUED TO	BALANCE	DATE REC'D	QUANTITY REC'D	SHIP No.	DATE ISSUED	QUANTITY ISSUED	ISSUED TO	BALANCE

being sent to the department supervisor as an order to change the machines to the new part and the latter to the central gage room. The gage room keeper gets

DATES when work must be finished are written on tracer tags which are turned over to machine control man for scheduling on machines.

the gages together, inspects them to see that they are in good condition, and places them in a container until called for.

The preparation of gages in advance eliminates considerable delay in setting up new jobs. When the job is ready for work to start, the change order is returned to the planning department and a check made on the machine board to indicate that the operation is under way.

Finished Parts Are Listed Daily

Daily reports are sent to the planning department by the producing departments, listing the quantity of parts finished. The schedule man then marks in red over the yellow load line the time equivalent to the work completed. A check of the red lines against the dates at the top of the vellum sheets gives the status of each machine or group of machines. In this way, the control board shows at all times the essential information which is given below:

Work ahead of each machine
Material ordered from stock room
Material on floor
Machines set up
Jobs started
Quantity of each job finished
Status of schedule

The main problem is to keep the red lines even with the vertical silk cord. When a job is finished, inspected and moved to the shipping or stock departments, a report of its movement is sent to the production department. This information serves as a "material available" notice for the succeeding operation, showing that the job is on the floor available for dispatching in the manner heretofore described.

Dispatching jobs from the central planning department is done only on primary equipment: that is, no attempt is made to schedule operations, such as tumbling, where the equipment is flexible and the time required is short. In order that the work may pass through these departments in the order desired, a list of the various lots and their due dates is furnished department supervisors for their guidance. When it is remembered that parts in process are kept at a minimum and that the jobs are centrally controlled through their primary operations—and all first operations are primary—it can be seen that there is little else that departments performing minor operations can do except "follow suit."

Parts Go to Storeroom for Final Assembly

After the final operation has been completed, parts are transported to the parts stores room, weighed, and the amount finished is recorded on the tracer tag.

(*Concluded on page* 1281)

Form 201 — **CHANGE ORDER** — D C & Mfg Co.

Date 5-12-24 Lot No 2833-14

Mr Burk Dept ____ Set Up Machines Listed Below

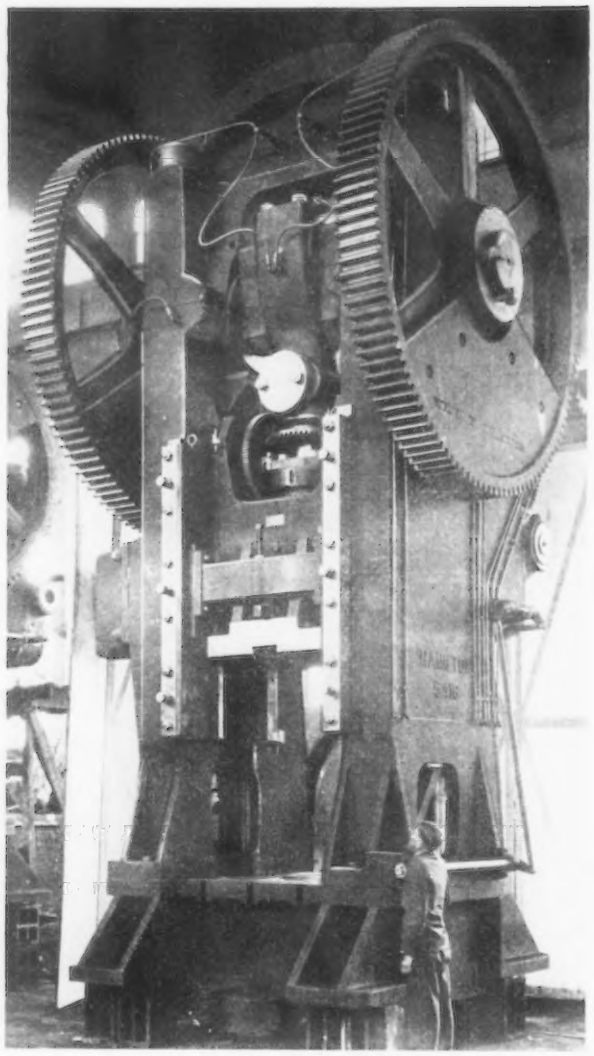
As Indicated, After Completing Lot 1833-13

Mach	Part	Oper	Trans	Mach	Part	Oper	Trans
3907		B5P3					
3908		B4					
3909		S17					

Remarks

Set Up
Made by ____
OK'd By ____
Date ____

Machine change order is sent by schedule man to department supervisor as order to change machines to a new part prior to starting a new job.



PRESS in which brake drum is formed, this view having been taken prior to installation of the machine.

FORMING BRAKE

By J. B. NEALEY
American Gas Association, New York

HEATING blanks for making brake drums for the Lincoln car is performed in gas-fired furnaces operating on the continuous principle. The blanks are formed to the approximate final shape in a single operation of the press. To absorb the blow of the ram a pneumatic die cushion is attached beneath this press, for the purpose of increasing the life of the parts and avoiding early breakdown.

INVOLVING the use of a large power press and a continuous, gas-fired furnace, the automobile brake drum made at the plant of the Lincoln Motor Car Co. affords a good example of deep drawing heavy stock on a mass-production basis. The stock is a high-carbon, high-manganese steel plate ½ in. thick. Blanks 23 in. in diameter are used.

These are heated and then are formed to the approximate shape of the brake drum in a single operation of the press. The press weighs 125 tons and will exert a pressure of 1000 to 1500 tons. For forming the brake drum the press is equipped with a punch and die, the die having a cylindrical hole in the center, slightly larger than the finished drum. The hot blank is positioned in the press over this die and the punch descends and forces it through the die, forming the flange of the drum against the sides of the hole in the die. The ram and punch are forced down by back-geared cranks and the length of stroke of the press, after contacting the hot blank, is 20 in. to carry the blank through the die to the ejecting position.

A clamping cushion actuated by compressed air is used to keep the blank from slipping while forming, and a pit 16 ft. deep under the press to accommodate this is part of the equipment. The pneumatic die cushion is a feature which has been introduced for metal-drawing work, on single-acting presses, to provide uniform pressure on all sides of the blank. It also reduces excessive strain on the press from high tension at the end of the stroke.

As installed on the press described, the die cushion is fastened to the press by means of four suspension rods attached to the web of the press. Usually this type of cushion is attached to the underside of the press bed, but it may be fastened to the bolster plate. A pressure pad bottom against the underside of the press bed was a special requirement in this case.

There is also a center knockout, which strips the formed blank from the punch and, as the punch comes to the end of its stroke, the formed drum is pushed out from under the die for delivery through a slot in the back of the die. The die and punch are lubricated with heavy cylinder oil and the punch is water cooled.

For making these brake drums the press is served by a gas furnace. At the discharge end of the furnace is a short roller conveyor running direct to the press.

DRUMS FOR LINCOLN CARS

An operator with tongs takes a hot blank as it is discharged from the furnace and guides it down the roller conveyor directly into the press. A crew of three men will turn out 400 brake drum pressings in a single shift of 8 hr.

Designed for continuous use, the furnace is semi-automatic in operation and is constructed of brick, suitably insulated and encased in steel. This furnace is 20 ft. long, 6 ft. high and 6 ft. wide, and is heated with seven gas burners on each side, or 14 in all. Firing is below the hearth, the heat rising around the sides and behind a baffle wall a foot high, constructed of refractory material. The heat rises until it strikes the arch, where it is reflected and radiated down on the work.

A separate manifold supplies gas to each group of seven burners and each manifold is provided with an inspirator. Gas is supplied at 12 lb. pressure and air is inspirated in any proportion to give a reducing, oxidizing or neutral fuel flame within the furnace. In this case a neutral flame is necessary, to prevent oxidizing the surface of the blanks. Once set, the correct gas-air ratio is automatically maintained regardless of the volume of work going through the furnace. Waste heat is removed through take-off flues at each end, and exhausted through a hood and duct with fan to the outside of the building.

On each side of the bottom of the furnace are lengths of U-shaped alloy castings with short legs, which rest upon the hearth and extend lengthwise through the furnace, forming continuous grooved rails. Pieces of iron pipe of suitable diameter to slide in these rails, and of a length slightly greater than the diameter of the blanks to be heated, are placed on the rails, one on each side, and a drum blank is laid on these pipes. Upon this blank is placed a pronged circular ring of alloy casting which acts as a spacer, and upon which another blank is placed. Blanks are stacked four high, thus providing a space between the hearth and the first blank and between the blanks themselves for uniform circulation of the fuel flame, which speeds up and materially aids in uniform heating.

When a stack of blanks is ready, the furnace door

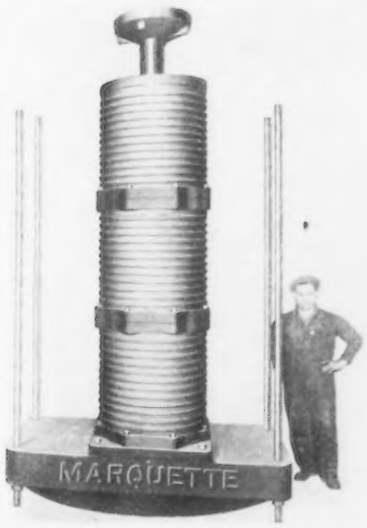
(*Concluded on page* 1281)

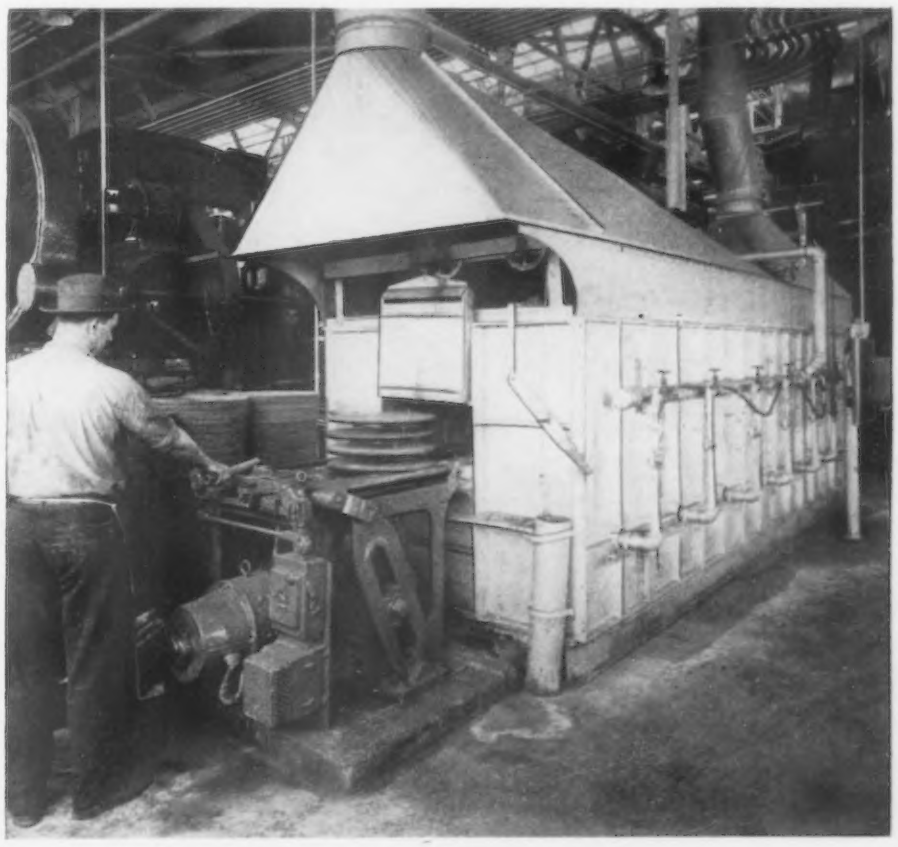
▲ ▲ ▲

LOADING end of gas-fired forging furnaces in which steel plates are heated prior to forming into brake drums. This furnace is continuous in operation and controlled automatically as to atmosphere, temperature and heating period.

❖ ❖ ❖

(Below) Pneumatic cushion installed under brake drum press, suspended from the press web by four rods.





MACHINING THE SADDLE CA

By SIDNEY G. KOON
Associate editor, THE IRON AGE

TWO large problems were involved in machining the cable saddle castings for the George Washington Bridge at New York over the Hudson River. One had to do with meeting an exceptionally close tolerance over the joined surfaces and the base of the enormous structure. The other had to do with finishing the grooves for the successive strands of the cable to a definite arc of a circle of 30-ft. radius, and again within tolerances measured in thousandths of an inch. These were done by the Midvale Co. through the use of certain special and partly improvised equipment.

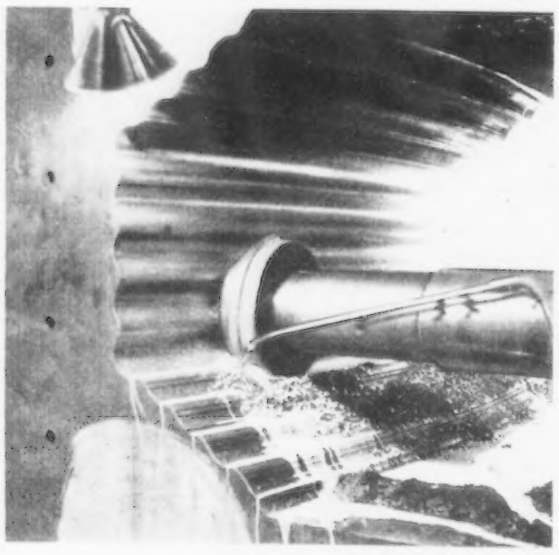
WHEN the steel castings made by the Midvale Co., Nicetown, Philadelphia, for the saddles to seat the Hudson River bridge cables were shipped, the shipping weight for 32 castings totaled 2,874,290 lb. This makes an average of just under 90,000 lb. to the casting, and a little more than 359,000 lb. to the saddle, consisting of four castings.

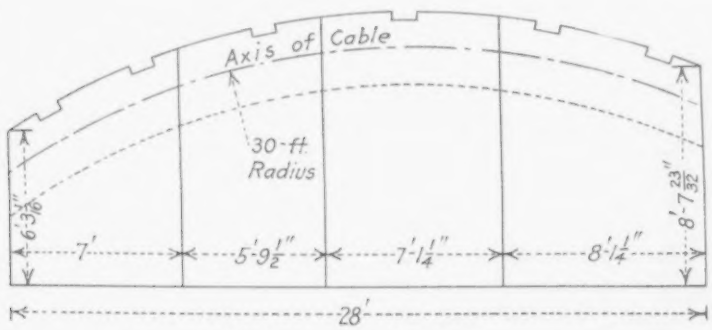
Machining these castings was an outstanding performance not only because of the great size, but also, and more particularly, because of the unusually close tolerances demanded by the Port of New York Authority for some of the surfaces. Except for the cable grooves the surfaces were all plane. But inasmuch as these plane surfaces to a large extent had to come within a few thousandths of an inch of being perfectly flat, the problem involved was considerable.

In the first half of the article we described the method of molding and casting these large units, together with the subsequent operations of cleaning and annealing. When it came to machining, however, a number of unusual expedients were adopted in making use of existing equipment insofar as this was possible. In doing this some novel methods were evolved which are briefly described herein.

As cast, each piece had the rough contour of the ultimate cable grooves cast in it. This was for the purpose of minimizing the amount of machining on this part of the surface. These grooves fit the lower half of the cable as it passes over the saddle, and the cable at this point is in the arc of a circle with a radius to center of cable of 30 ft. Thus, with a 36-in. cable, the bottoms of the grooves have a radius of 28 ft. 6 in.

After the castings were thoroughly annealed they were set up on a plane table and subjected to careful





GENERAL elevation of saddle in four steel-castings, aggregating 28 ft. long and 8 ft. 6 in. wide. The cable passes over the saddle with a 30-ft. radius to center of cable. Slots in top of saddle are for carrying some of the cable spinning gear.

(At left) Detail of finishing cut on one of the grooves for the cable. These were all finished to template.

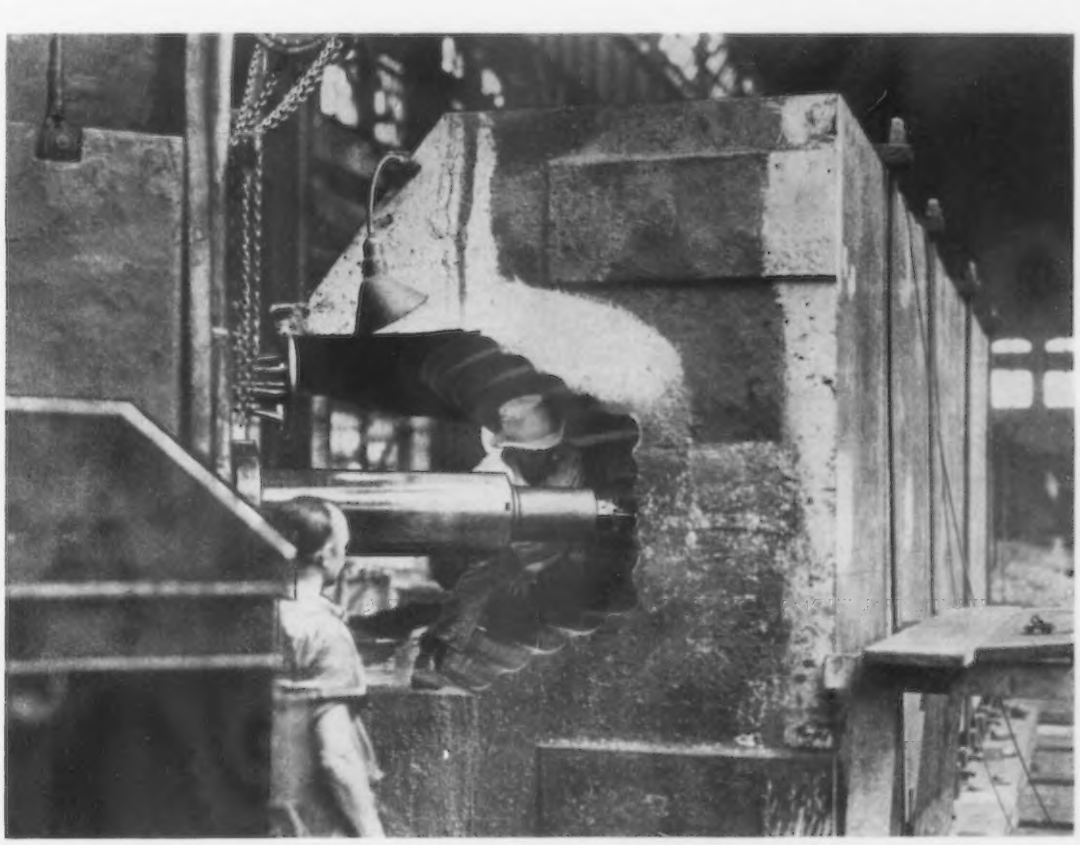
LE CASTINGS FOR HUDSON RIVER BRIDGE CABLES

measurement to ascertain how much material would have to be removed from the base to leave the minimum safe amount of metal in the cable grooves for machining (about ¾ in. was left). As explained in the preceding article, the casting was made upside down, with the ultimate base at the top of the mold. This was for the purpose of putting the densest part of the metal at the working surface of the cable grooves. This left a considerable volume of metal to be removed from the base of the casting, and made it possible to go below the blow-holes which are likely to appear in the top surface of any steel casting.

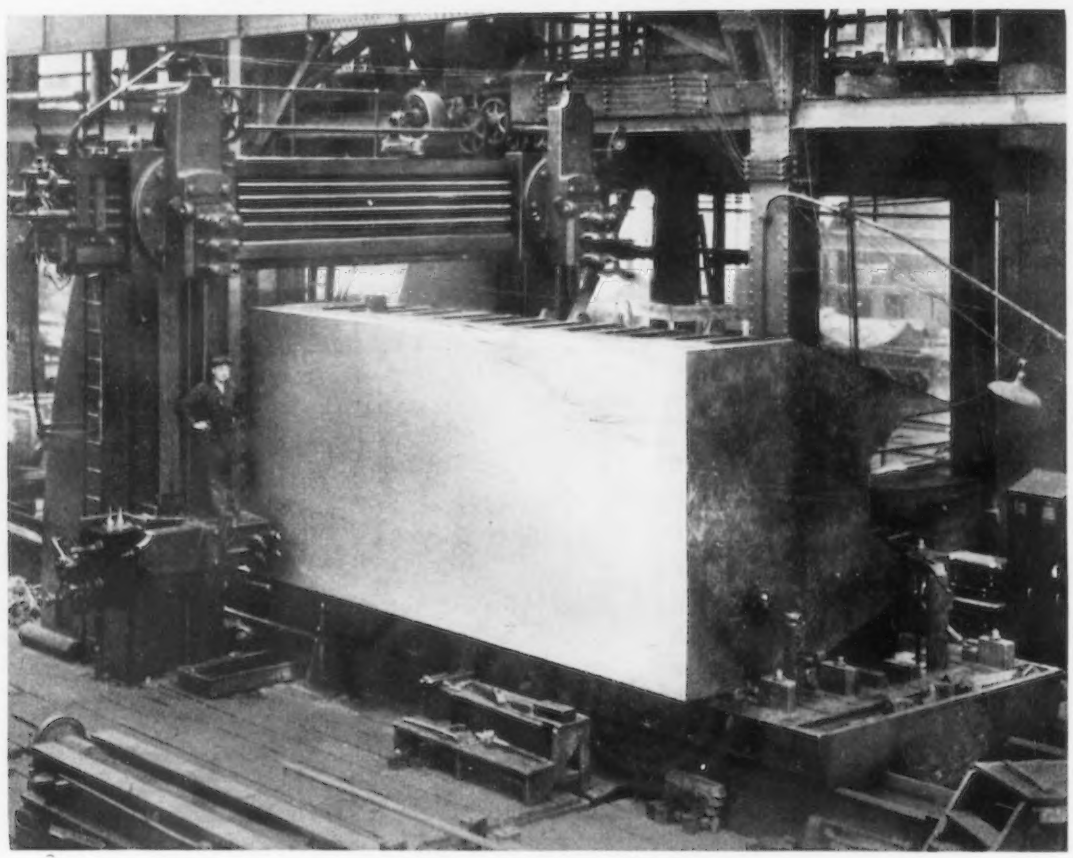
Having thus ascertained the extent of cut to be made in the base, a roughing cut was made all over the base by means of a circular face mill about 10 ft. in diameter, using 50 inserted teeth of high-speed steel. This roughing cut left a surface which would be parallel to the final finishing cut and which could be used as a basis for machining the ends of the castings for the exceptionally close fit demanded from casting to casting.

These ends were in turn rough cut by means of the same rapid operation of the big circular face mill. For the next operation the castings were placed upon a 12-ft. planer and the ends given the finish cut, permitting them to be joined casting against casting to an unusually close fit. These surfaces were required by the inspectors to be finished to limits within a very few thousandths of an inch.

When it came to putting the finish on the base of the castings it was required that this be done on the entire saddle, consisting of four castings. It was

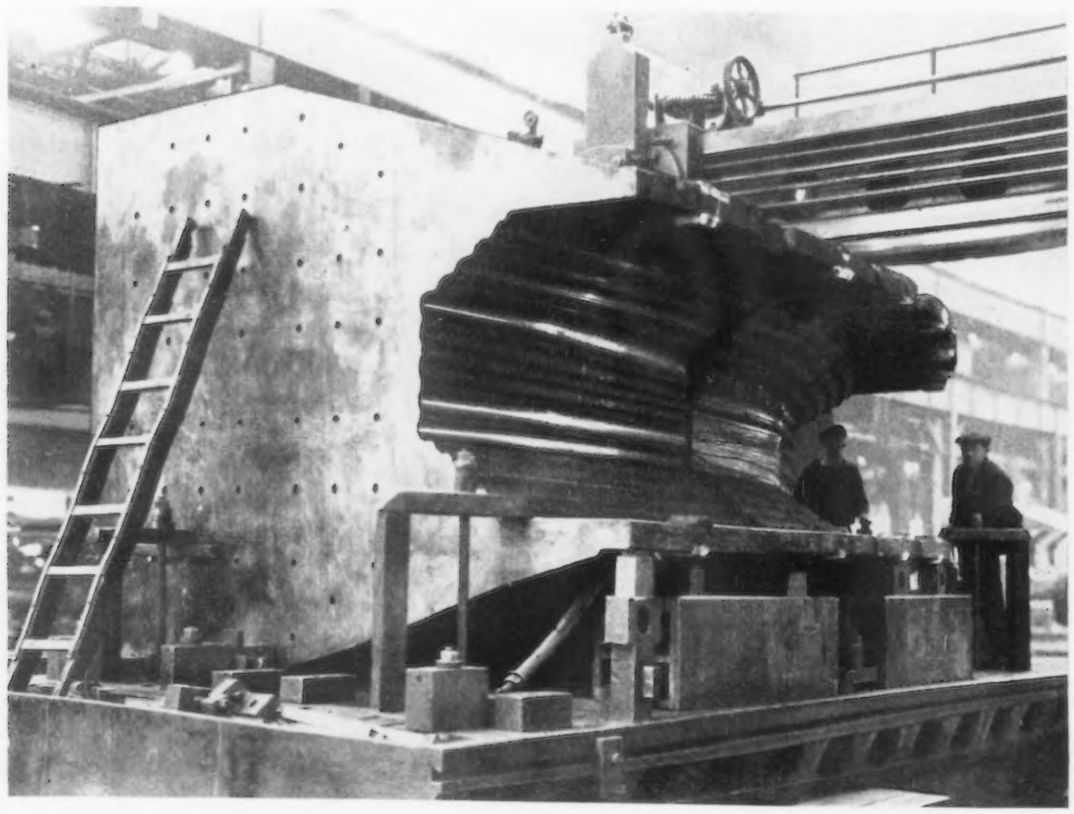


FINISHING a cut in a cable groove by means of a rose miller.



PLANING base of three castings simultaneously, representing nearly 150 tons.

found, however, that the ways of the planer could not safely be loaded to more than about 150 tons of casting weight. Hence, three of the castings were set up on the planer for the finishing cut. After this had been completed on the three, the end casting of the three was removed and the casting for the other end was put in place. Then this was finished to the same tolerance as the rest and with the same long base on which to measure. It may be mentioned that the base of the saddle measures 8½ by 28 ft. As the end sections are, respectively, 7 ft. long and 8 ft. 1¼ in. long, the surface machined at one time measured 8½ by 21



SET-UP of three of the castings on 12-ft. planer for purpose of finishing base. The ends of these castings have been completed and drilled, as shown, for the bolts holding them together. The grooves here shown are as cast in the material; they have not yet been machined.

Circular face mill for making roughing cuts on castings. Fifty high-speed steel tools are inserted near the periphery. (At Right) Taking roughing cut on the grooves for the cables. This cutter mounted on a traveling carriage on a groove base traverses the face of the work.

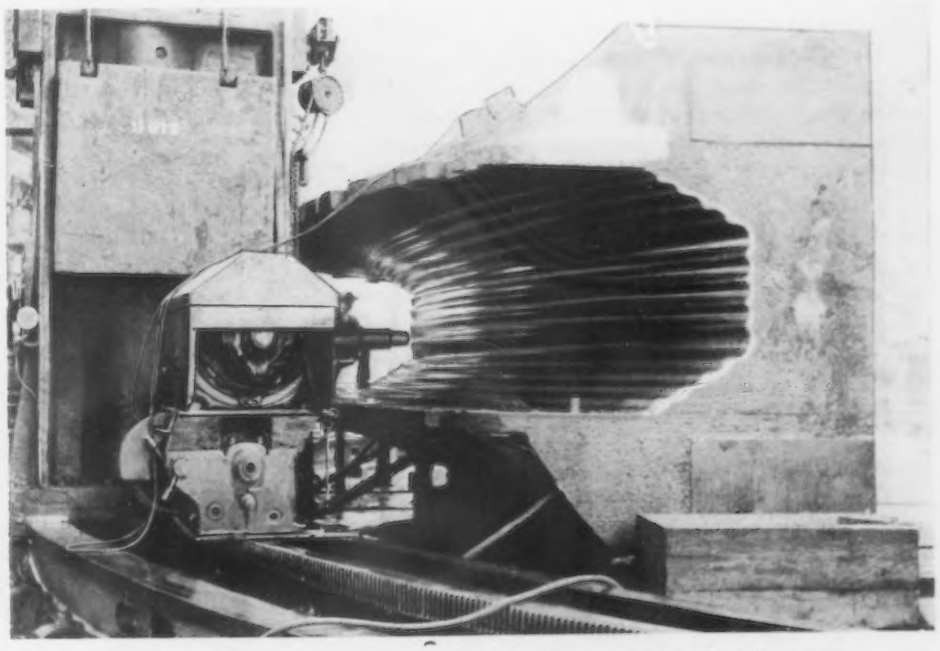
ft. in the one case, and 8½ by just under 20 ft. in the other.

After the end joints had been machined and had passed inspection they were drilled with about 50 holes for the connecting bolts. As each casting is symmetrical about its longitudinal central plane, and as the end joints differ only in the depth from the grooves to the base, a single template sufficed to locate all the holes to be drilled. In the case of the shallow joints it was simply a case of omitting the holes overlapping the base at that point. Through these holes the groups of three castings were bolted securely together for the operation of planing the base.

For the ticklish job of milling the cable grooves to their accurate 2-in. radius in cross-section and to the 30-ft. radius to center of cable, a novel set-up was employed. The four bolted sections of the saddle were held stationary, while the tool was run over the surface by means of a special guiding arrangement devised in the plant and appropriate for this purpose.

Machining equipment consisted of a cutter head and cutter, mounted on a horizontal miller, which traveled on the ways of a curved base. Traverse of the upright, with its cutter head and tool, was by means of rack and pinion, the rack being attached to the cast iron base sections. This rack was on a definite radius from the center of the circle on which the cable grooves were based. Consequently, as the tool was car-

(*Concluded on page* 1281)



General appearance of the work and the tool used in machining the cable grooves.

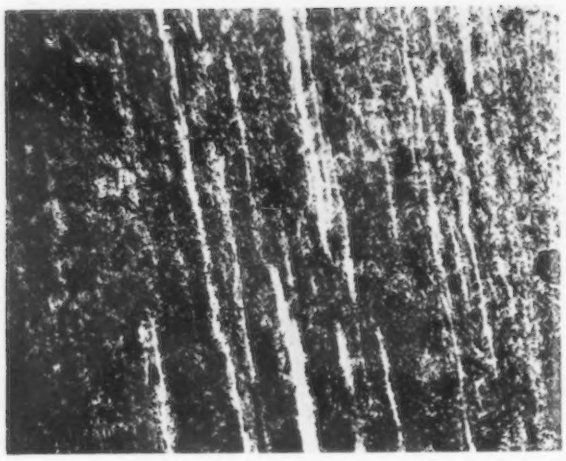


Fig. 1.—Laminations in Swedish wire. (Reduced about 25 per cent from 100 diameters.)

INCLUSIONS CAUS MA VALVE SPRIN WI

By FRANK STONES
Metallurgist, Eaton Spring Corpn., Detroit

IN Section 1 of the Iron and Steel Institute report on the "Heterogeneity of Steel Ingots" it is stated that no ingot ever produced is completely homogeneous, however carefully the steel may have been made and cast. It is equally true that no ingot ever produced is free from segregates and non-metallic inclusions, their number and manner of distribution varying with the steel-making process, melting and pouring practice, and size of ingot made.

The importance of impurities and inclusions in solids has long been recognized. Griffith, (a) the British physicist, believes that the great difference between the theoretical cohesion and the actual values obtained in tensile tests may best be explained by the hypothesis that throughout the mass of all solids are minute discontinuities or flaws, and that the effective strength of engineering materials might be increased, perhaps 10 to 20 times, if such flaws could be eliminated.

Regarding failures in correctly heat-treated springs which have not been over-stressed, it is safe to say that 90 per cent of those investigated by the writer were due to the presence of non-metallic inclusions located near some highly stressed area.

It is possible for an inclusion to have little or no effect on the life of a spring. Gillet and Mack point out (b) that an inclusion which is some distance away from the point of maximum stress need not necessarily cause failure. They obtained from Prof. H. F. Moore a specimen of normalized steel which had an endurance limit of 42,000 lbs. per sq. in., and which was run at 40,000 lbs. per sq. in. for 100,000,000 cycles without failure. This was found to have a large longitudinal inclusion with its tip 0.1 in. away from the point of maximum stress. They conclude that, when the position of an inclusion is such as to produce a higher local stress than the endurance limit, it may start fatigue failure, even though the nominal computed stress is below the endurance limit of the material.

It will, however, be shown that in the case of many spring failures the inclusion is not alone in its detrimental effects on the wire. It is often inclosed in an envelope of soft iron, and this may, and often does, extend to the surface of the wire, the most highly stressed part of the spring.

Five Principal Impurities in Commercial Steel

Available knowledge regarding the composition and metallographic identification of non-metallic inclusions is far from complete. There seem to be at least five principal impurities in commercial steel: sulphides of iron and manganese, silicates of iron and manganese and oxide of iron. And these do not usually occur in the pure state.

There is little divergence of opinion from the statement that inclusions are principally the product of the reaction of the oxygen and impurities in the unfinished steel and of the deoxidizers such as manganese and silicon, besides which there is no

Fig. 3.—Fracture of a broken spring following a ghost line. (Reduced about 25 per cent from 750 diameters.)

(a) Griffith—"Phenomena of Rupture and Flow in Solids," *Transactions*, Royal Society.
(b) Gillet and Mack—"Molybdenum, Cerium and Related Alloy Steels," the Chemical Catalog Co.; also "The Fatigue of Metals" by Moore and Kommers.

MAJORITY OF WIRE FAILURES

Fig. 2.—Laminations in Swedish wire. ▲ ▲ ▲ (Reduced about one-fourth from 150 diameters).

NINETY per cent of the failures of correctly heat-treated springs investigated by the author have been due to the presence of non-metallic inclusions located near some highly stressed area. He adds that about 99 per cent of the hardened and tempered valve spring wire now in use is badly laminated.

The danger of surface decarburization to the life of a spring is emphasized. A plea is made for a greater proportion of tested material to reduce the risk of breakage. A German machine tests 96 valve springs at one time.

doubt that small pieces of furnace linings, landers, ladle linings, washings from the nozzle, oxidation by air during teaming, and dirt in ingot molds are all sources of inclusions which, owing to their lack of buoyancy, have insufficient time to rise to the surface of the metal and are entrapped by the freezing crystals of the ingot, or collect in the slower cooling portions, giving rise to "ghosts." There is no evidence that non-metallics are soluble in solid steel. The association is purely a mechanical one.

(c) Stead—"Note on Inclusions in Steel and Ferrite Lines." *Journal* Iron and Steel Institute, 1918, Vol. I, page 287.
(d) Brearly, A. W. and H.—"Ingots and Ingot Molds." Longmans.

Fig. 4.—Inclusion surrounded by ferrite found in broken valve spring. (Reduced about one-fourth from 1000 diameters.)

The consideration of impurities in valve spring wire would be most incomplete without some mention of that type which appears as laminations, ghost lines or banded structure. It is safe to say that 99 per cent of hardened and tempered valve spring wire in use at the present time is badly laminated.

Ghost Lines Associated with Inclusions

Photomicrographs, Figs. 1 and 2, are average in revealing laminations for the particular type of etching reagent employed. There is no doubt that ghost lines are associated with inclusions, and in many cases inclusions can be seen lying in the center of the streaks which appear to be of a lower carbon content.

For many years leading metallurgists have attempted systematic investigations of this type of defect, and the result may be gaged by a consideration of the microphotos, which represent the best material available. We have, however, as a result of these researches, several interesting theories.

Stead (c) states that the evidence of his experiments is conclusive that non-metallic inclusions in steel do not lead ferrite to crystallize around them, and that it is phosphorus—almost always associated with inclusions—which leads to the formation of ferrite ghost lines; further, that when the inclusions are not associated with high phosphorus, no ferrite lines appear.

Brearly (d) in his book "Ingots and Ingot Molds"

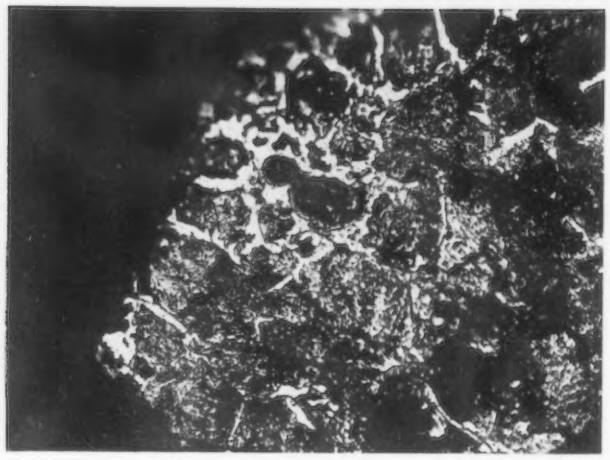


Fig. 5.—Inclusion surrounded by ferrite found in broken valve spring. (Reduced about 25 per cent from 600 diameters.)

says: "There can be no doubt slag exerts a selective action and forms nuclei around which micro constituents appearing in the solid steel tend to segregate." In support of this he experimented by drilling small holes in a billet, placing a quantity of hammer scale, open-hearth slag and pure silica sand respectively in the holes, riveting over, fusing the heads, and finally heating and rolling the billet into a bar. When the part containing the hammer scale was sectioned, nothing was found save a large patch of ferrite, due obviously to the decarburizing action of the scale. The ferrite border about the open-hearth slag was very distinct, which also may have been due partly to decarburization, but the ferrite border around the silica sand was unquestionable.

How (e) does not agree that slag will attract ferrite, but expresses the view that the austenite grains dispose along their surfaces any slag which they may contain and, in later cooling through that range, deposit the ferrite (or cementite) in like manner, and hence this later arranged matter is found surrounding the earlier arranged slag. Howe has much evidence to prove this motive power of the austenite grain.

(e) Howe—"The Metallography of Steel and Cast Iron."

(f) Whitely—"On Ghost Lines and the Banded Structure of Rolled and Forged Mild Steels." *Journal* Iron and Steel Institute, 1926, Vol. I, page 213.

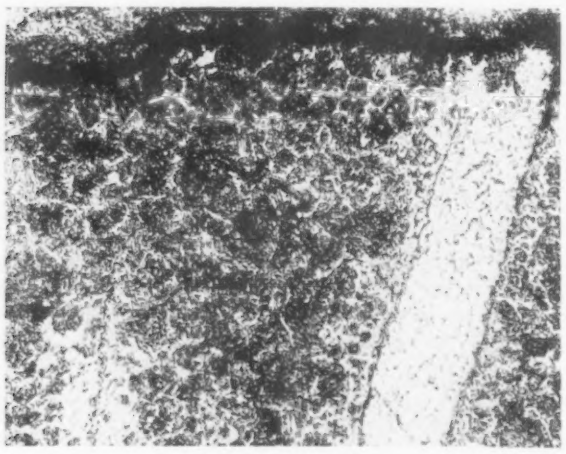


Fig. 6.—Decarburized fin rolled into valve spring rod and drawn into wire. The spring failed. (Reduced about one-fourth from 150 diameters.)

Swedish Wire Low in Phosphorus

Concerning Swedish spring wire with its low phosphorus content, it is extremely doubtful that phosphorus is the cause of banded structure. Whitely (f) showed that only when variations in percentage of phosphorus exceed 0.07 per cent does it cause the removal of the carbon, and he also showed that even with phosphorus down at 0.004 per cent banded structure was in evidence.

The theory that slag or non-metallic inclusions attract ferrite is also open to doubt, when it is considered that lengthy heating at high temperatures, even if followed by slow cooling, will remove banded structure in some steels, the inclusions remaining in their original positions.

That ghost lines can be removed by lengthy heating is of no advantage, since the accompanying evils do not allow of its use as a commercial remedy. From all available data it would seem certain that ghost lines are the result of heterogeneity not only of phosphorus, but also of sulphur, though it is far from certain whether inclusions are incidental or their direct cause.

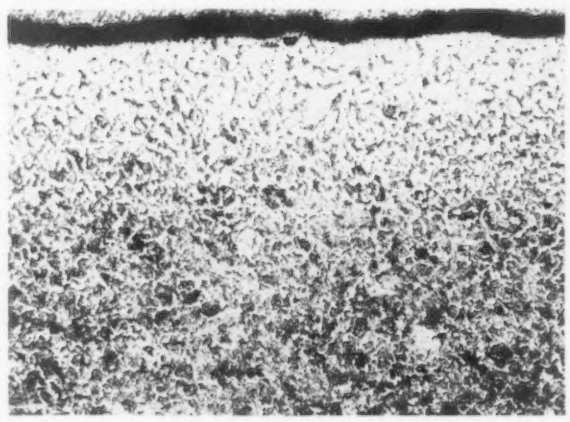


Fig. 7.—Decarburized domestic wire. (Reduced about one-fourth from 150 diameters.)

In the case of spring wire certain consolation may be gathered from the fact that invariably laminations gradually diminish toward the more highly stressed portions of the wire; and it is debatable that they are the direct cause of spring failure, especially since practically all high-carbon steel valve springs are coiled from laminated wire. They probably do exert considerable influence on the path the track travels once it starts, as is indicated by Fig. 3. Inclusions which will cause failure are such as are shown in Figs. 4 and 5. This type of inclusion is surrounded by a border of ferrite very well marked, and is in many cases close enough to the surface of the wire to open up into a crack, breaking a very short time after being put into use. This type reacts distinctly to the stannous chloride test of the inclusion identification chart of Campbell and Comstock, which is indicative of iron oxide. That inclusions can be mechanically rolled into a wire is shown in Fig. 6. The inclu-

sion in this case appears to be a decarburized fin which has been rolled into the rod, the decarburized area being bordered by scale.

Surface Decarburization and Life of Springs

The importance of surface decarburization to the life of a spring cannot be overestimated. The effect of this is to lower the endurance limit of the skin of the wire where it is most highly stressed to about half what it should be; in other words, the spring has the torsional fatigue properties of an untempered wire. Such a wire is shown in Fig. 7.

When it is considered that there is so little leeway between what valve springs are required to do and what the best wire obtainable will do, the probability of defects causing breakage is very great. The stereotyped tests to which a bundle of wire is subjected are helpful in eliminating some defective material, but it cannot be ignored that, while one or both ends of a bundle may be of good wire, some other portion may be defective.

Necessity for a greater portion of tested material must be conceded if occasional breakage is to be avoided. This is no new thought. There is already a German machine designed to test 96 valve springs at one time. The springs are given the service preload and 10 per cent more stress than in service and within this range vibrated 5,000,000 cycles at 1500 camshaft r.p.m. If the springs are going to fail they will do so during this test, and such tested springs may be used with considerable confidence, and with little risk of the inexplicable spring failure so often dismissed with a vague allusion to fatigue.

▲▲▲

USE AND ABUSE OF HACKSAW BLADES AND BAND SAWS

By L. B. THOMPSON

SAWS assigned to one operator are seldom abused. Considerable mistreatment may occur, however, if they are available for general shop use, especially in the case of the relatively more expensive band saw.

One of the most common forms of abuse, perhaps, is failure to select the proper type of blade for the material to be cut. Steel or cast iron, for instance, requires a highly tempered saw—too brittle for the high speed required of a saw for cutting wood. On the other hand, the flexible wood saw is too soft to cut steel or cast iron. The form of the work, as well as the material to be cut, should govern the choice of a saw. Metal tubing or thin sheets are an example; it is difficult to cut them with a saw having coarse teeth, but easy enough if a fine-toothed blade is used. If a radius is to be cut, care should be taken to select a saw narrow enough to make the turn without cramping.

In adjusting the saw blades in the machine, it is important to get the correct tension. Too much or too little tension may cause the blade to perform poorly or break. The guide rollers of the machine should be adjusted close to the work so as to give the blade proper support, but should not come in contact with the saw teeth, as this will dull the saw and change the set of the teeth.

When steel is to be sawed it should be held rigidly in a vise or clamp. If the piece to be cut off is heavy or bulky it should be supported so it cannot fall when cut, as this will injure the saw blade.

Too Much Feed Breaks Saw Blade

Excessive feed is the most usual cause of saw blade breakage. Where an adjustable feed is used the adjustment should permit the blade to clear itself, otherwise the friction will cause the blade to heat, stick in the slot and break. Saws having a gravity feed should not be forced by adding weights or by other means. When work is fed into the saw by hand very little pressure should be used and the saw should be allowed to clear itself as it cuts.

A lubricant or coolant should be used when sawing material requiring lubricant or coolant in other machine operations, such as drilling or milling. This will carry away the chips and keep the work cool. It is important that band saws be well lubricated when cutting steel and similiar material. Materials which ordinarily are machined dry should be sawed dry.

Relieve Tension of Idle Band Saws

It is good practice to relieve the tension on band saws when they are to be idle for some time—over night or over the week end. This avoids stretching the saw unduly, and will lengthen its life. The "rolling" of a band saw for storage should be done only by an expert who thoroughly understands the operation.

A dull, gummed, or broken blade should never be used; such blades not only slow up production but may cause an accident. Hack saw blades that have been broken at one end may be salvaged by softening the end for a short distance and drilling a hole to match the hole in the unbroken end. If a few teeth are broken out, grind the edge of the blade at the damaged place until a surface is obtained that will not catch in the work. The grinding should be eased off at each side of the broken teeth.

To get the full use of a hack saw blade, place a shim in the vise; this tends to shift the work in the vise and, by bringing more teeth into action at one time, increases the cutting efficiency.

COMMERCIAL HEAT-TREATING PLANT HAS 16 FURNACES

By HARRY TURNER
Secretary, Ohio Heat Treating Co., Dayton, Ohio.

THE rapid advance in metal technology, involving constantly changing types of steel, has made heat treating one of the vital factors in production. Today purchasers of metal parts are exacting in their requirements and send their metallurgists and inspectors to the producing plants to see that their specifications are followed.

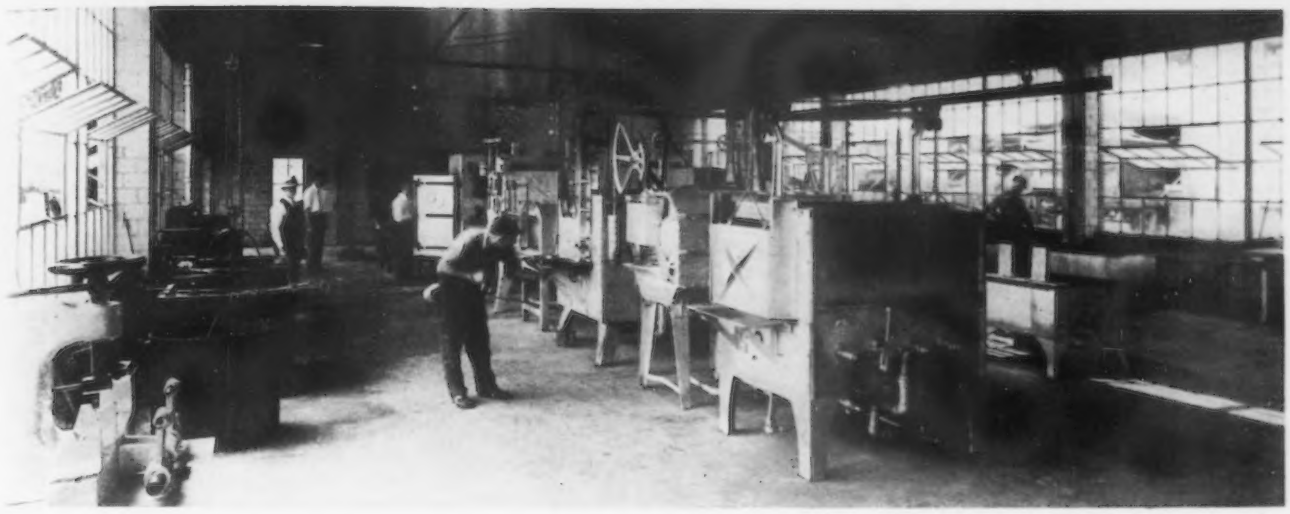
This development has particularly affected commercial heat-treating shops, necessitating installation of modern furnaces and auxiliary equipment, automatic temperature and furnace control, proper testing devices and, above all, a type of operator or supervisor who understands not only the bare handling of the materials, but also the characteristics of the steel treated.

Commercial Heat Treater Must Have Broad Knowledge

He should possess a general knowledge of the more technical side of the art, such as the value of the rate of heating, holding time, critical temperatures, quenching and drawing operations, and should be able to judge the results to be expected from the ultimate use of the product. He likewise should know the effect of the tool design in the distribution of metal throughout the product, location of holes or recesses, tolerances and the effect of improper finishing in grinding and handling the piece.

The commercial shop is more subject to complaints and rejections than a heat-treating department of a large plant, where responsibility can be impartially and easily traced. Hence it is often compelled to trace tactfully the history of a product on which it has only one operation through several outside plants. This in itself is a service which requires surprising knowledge and good judgment.

Many small manufacturers have found their heat-treating departments inadequate and therefore unsatisfactory, with the cost of rehabilitation and operation not commensurate with the amount of work handled. In districts where local reliable commercial heat-treating shops have been estab-



HEAT-TREATING furnaces are arranged in two rows, back to back, with monitor roof overhead for localizing and removing excess heat.

lished they have been led to abandon these departments, their work passing to the commercial shops already set up with the necessary equipment, capacity and technique to handle it at a low cost and at a speed practically equal to a department in the plant itself.

Cognizant of this trend, our company recently constructed a new plant designed especially for heat-treating operations. Eight oven-type furnaces are arranged in two rows, back to back, with monitor roof overhead for localizing and removing excess heat, thus adding to the comfort of the men and to the ease and convenience of operation.

Sixteen Furnaces Available

The furnaces range from 12 x 24 x 9-in. high-speed to 36 x 84 x 24-in. (inside measurements) carbonizing furnaces. In addition, there are seven pot-type furnaces, including salt, lead, cyanide and aerocase baths. For drawing and tempering there is a gas-fired, shelf-type, recirculating air-drawing oven, which has proved satisfactory. Recording and controlling instruments are mounted on two panels, one for each row of furnaces, so that they are easily accessible to the operators. Furnaces are equipped with single-valve, automatic gas-air proportioning mixers combined with mixture pressure gages and electric control valves, with signal light systems for observation and control.

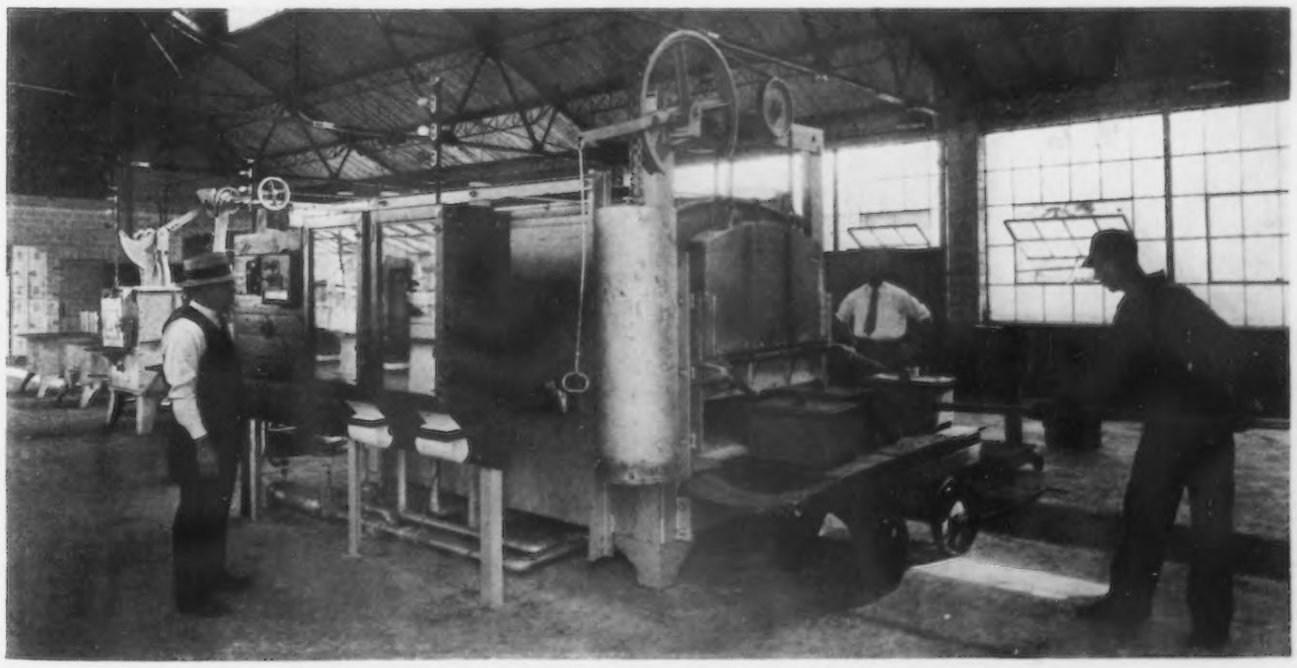
The building is 43½ x 120 ft. and has abundant window space giving natural light, in spite of the fact that the light is a handicap to furnace operators who are tempted to supplement the records of instruments by their own color observations. However, liberal use of automatic recording controls removes this responsibility from them.

Quick Aging of Zinc Die Castings

Among the almost infinite number of specifications of heat treatments for the many classes of work encountered in a commercial shop, the quick aging of zinc die castings is a recent addition. These die castings change their characteristics on aging at normal atmospheric temperatures for long periods. They may expand after machining as much as 0.030 in. on castings about 8 in. long. Other properties may change irregularly. After a 24-hr. treatment at 300 deg. F., this expansion is eliminated.

One of the hardening furnaces designed for 1800-deg. operation has been set aside for this work and arranged with automatic gas and temperature control to produce on the recorder practically a straight-line temperature of 300 deg. It is nor-

ONE of the large carburizing furnaces. All piping is concealed in the covered trench between the rows of furnaces.



mally rather difficult to procure uniform heat at such low temperatures in a furnace with a rated fuel capacity for 1800-deg. operation. This is readily accomplished, however, by means of a specially designed burner with automatic control which heats the entire hearth and material uniformly. This furnace is used because the automatically controlled vertical oven could not be spared for this purpose.

All piping is concealed in a covered trench running between the rows of furnaces and large enough to permit freedom of work on any of the pipe. Branch lines, such as air and gas lines to furnaces, electric conduit for controls, pyrometers and signal lights and water and drain lines to quenching tanks, are buried up to the equipment proper. This arrangement insures freedom from the maze of piping usually found in heat-treating departments, giving an exceptionally clear shop overhead and around the furnaces and other equipment.

The air system is designed as a loop using two blowers, one on each side with valves so arranged that each blower supplies air to one or both sides, enabling either or both blowers to be used for the entire shop as production requirements demand.

One Large Furnace Is Over-Fired

The large Mahr furnace is over-fired with a system of circulating waste gases under the hearth, giving a difference in temperature between the furnace heating chamber and the vent outlet gases of over 500 deg. F. The case thickness is uniform throughout all pots, even when pots without legs are used. The hardening furnaces are all of the under-fired semi-muffle type.

A 24-hr. service is maintained from the time materials to be heat treated are called for until they are returned to the customer. When work is received, shop record cards are filled out and the work routed. The specifications accompanying the work are checked against the material composition as well as against previous experience records to guard against error. If the specification appears at fault, the customer is immediately consulted and heat-treating recommendations made.

It is the company's established practice to give an advisory service, based upon its experience in all types of work, as to recommended types of steel, design features, heat treatment, tolerances, and subsequent finishing—all based upon the ultimate use of the tool. Failures and rejections are thus kept at a minimum and friendly relations with customers maintained. When work is finished, the results are checked on various testing machines to insure conformity with the specifications. Contact with the job is maintained at regular intervals after delivery as a check upon the satisfactory performance of the heat-treated material.

Magnesium Alloy Finds Varied Uses in Germany

ELEKTRON, a magnesium alloy, which is coming into wider use in Germany, especially for aircraft, was first introduced commercially in Germany about 1909, when samples were shown at the International Aeroplane Exposition at Frankfort.

Rapid advances in its use were made during the war, and since the armistice it has been widely adopted by German aircraft builders for use in motors, wings, fuselage and for interior furnishings of large transport planes. Recently the German Lufthansa has been installing chairs and other furnishings of elektron in the larger planes.

The annual German production of the alloy is about 6000 tons, made by the I. G. Farben Co., Bitterfeld, a subsidiary of the German Dyestuff Corpn. The only other Continental maker operates in Italy under license.

As manufactured in Germany and Italy, elektron has a specific weight of 1.8, melting point of 625 to 650 deg. C., and electric conductivity of 12 to 18. The tensile strength ranges from 10 to 22 kg. per sq. mm. (14,000 to 31,000 lb. per sq. in.) for castings, and 25 to 42 kg. per sq. mm. (35,000 to 60,000 lb. per sq. in.) for rolled material. The Brinell hardness ranges from 45 to 70.

While elektron oxidizes slowly, the white coating formed on the surface does not impair the metal. When used in aircraft construction, a brass paint is usually applied for a protective coating. The alloy is inflammable at more than 625 to 650 deg. C., and when being machined, turnings occasionally become ignited unless sharp tools are used at medium and low speeds.

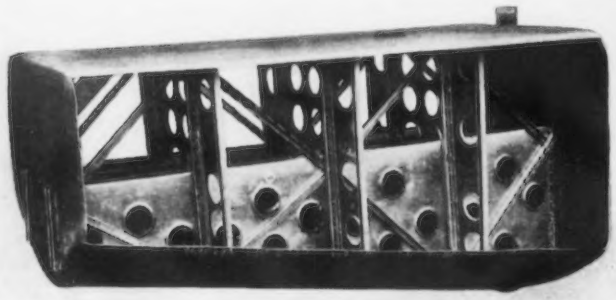
THIS cable car, used for transportation over mountain passes in Germany, has a body formed entirely of magnesium alloy. (Left)

▲ ▲ ▲

AIRCRAFT builders are making increased use of magnesium alloy for motor parts, fuselage, wings, interior furnishings and gasoline tanks. This tank is wholly of magnesium alloy, including the baffle sections inside. (Below)

▲ ▲ ▲

A GERMAN fireman holds aloft a ladder fabricated of rolled magnesium alloy, supporting the weight on his thumb. (Right)



THE MATERIAL FACTOR IN CARBON ARC WELDING

◆ ◆ ◆

DIFFERENCES of opinion as to the kind of steel best suited to carbon arc welding were voiced at the fall meeting of the American Iron and Steel Institute and at the meeting of the American Welding Society during the National Metal Congress in September. Issue was taken with the presentation of the views of the Lincoln Electric Co. at both meetings.

There is here presented both sides of this controversy—an abstract of the paper by Wilmer E. Stine, of the Lincoln company, read at the institute's meeting on Oct. 23, and abstracts of the discussions which were presented there and at the National Metal Congress.

Abstract of Mr. Stine's Paper

SINCE, in arc welding, the metal of the plates or parts being welded enters into the composition of the metal forming the seam, a complete study of the elements which affect the results in arc welding should include a study of steel used in the manufacture of plates and shapes as well as the electrode material.

Electric arc welding will be considered herein as that method of fusion welding in which the seam to be welded is filled with molten metal melted by the heat of an electric arc and allowed to solidify, thus forming the weld. Electric arc welding may be divided into three classes, as follows:

(a) Metallic arc welding with bare or washed electrodes.

(b) Metallic arc welding with shielded arc electrodes (electrodes with a heavy coating to protect the arc from the oxygen and nitrogen of the atmosphere).

(c) Carbon arc welding with a shielded arc.

Carbon arc welding with a shielded arc seems to offer the best method of welding for a study of the factors that affect the welding characteristics of steel.

Defects that may develop because of certain characteristics of the steel forming the weld are as follows: (a) cracks, (b) slag holes, (c) gas holes.

Causes of the first class of defect seem to be fairly well understood. This investigation is largely confined to the causes of the latter two classes of defects. Gas holes are not formed to any appreciable extent where the arc is in an oxidizing atmosphere. The weld metal in such cases is over-oxidized and has very little ductility and will not be a high-quality weld. High-quality arc welds can only be made with a shielded arc. Gas holes become an important factor in such welds.

Samples of Steels Used

The cooperation of several steel manufacturers was obtained in furnishing different series of samples for welding tests.

The first series of samples was made by taking very low-carbon, low-manganese steel and melting it in an electric furnace, adding various desired amounts of carbon and manganese. This steel was then rolled into plates and welded.

All samples in this group proved to be poor welding quality. Subsequent tests and analysis indicated that the steel used as a basis for this series of samples had been deoxidized with an excess amount of aluminum and that the aluminum was the principal controlling factor. The determination of small quantities of aluminum in steel is difficult and the accuracy problematical and is therefore not considered reliable. Analysis of the basic steel in the above series showed 0.018 per cent aluminum.

A second series of samples was obtained from various steel mills, and consisted of fire box, flange and tank steel having a carbon range of from 0.12 to 0.20 per cent. Each steel maker was asked to furnish information as to kind of furnace used, whether the steel was recarbonized, how it was deoxidized, and whether it was killed or rimmed.

A third series of samples of various carbon content was obtained from one steel maker and consisted of steel varying in specifications from SAE 1010 to SAE 1050 inclusive.

A fourth group of samples was obtained from two steel makers and consisted of samples from several heats of representative commercial grades of steel. The results of a few of the tests are shown in the table. While the results of only seven tests are tabulated, several hundred such tests were made.

It was found that steel which formed slag holes in the weld, as shown in Fig. 1, invariably had been aluminum killed and contained an appreciable amount of Al_2O_3. The sample shown contains 0.03 per cent Al_2O_3. This characteristic was checked by covering a piece of good welding steel with a thin layer of Al_2O_3 before welding it. The result was very similar to that shown in Fig. 1. To determine whether this characteristic is a matter of melting temperature of the inclusions, a similar test was made with chromite, which has about the same melting temperature (2050 deg. C.) as Al_2O_3. The result was almost identical.

It is evident that these slag holes or depressions are caused by nonmetallic inclusions in the steel which remained as finely divided solid inclusions during the steel making process, but during the arc welding process melted and coalesced to form large globules which solidified ahead of the steel and formed holes or pits in the weld metal. These holes can be eliminated by using a slag-forming flux of low melting temperature which will combine with the slag of the steel, forming a new slag having its melting temperature below that of the steel.

It has been fairly well established that the capacity of steel for holding gases in solution varies directly with temperature and the content of aluminum, silicon and manganese and inversely with the carbon content.

If the capacity of the steel for holding gases in solution is to be maintained at a value equal to what it was in the ingot molds, the aluminum, silicon or manganese must not be oxi-

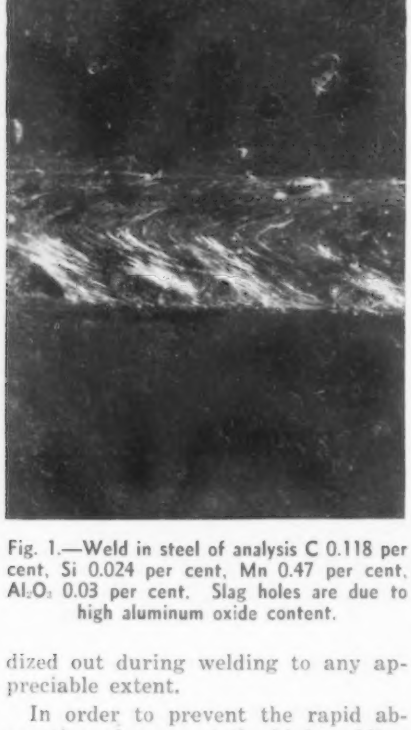


Fig. 1.—Weld in steel of analysis C 0.118 per cent, Si 0.024 per cent, Mn 0.47 per cent, Al_2O_3 0.03 per cent. Slag holes are due to high aluminum oxide content.

dized out during welding to any appreciable extent.

In order to prevent the rapid absorption of gases at the high welding temperatures the content of aluminum, silicon and manganese should be as low as practicable. The oxidation of carbon during welding is permissible, but this reaction should cease before solidification of the weld metal begins.

In other words, chemical equilibrium should be reached between the carbon and the oxygen in the steel at a temperature slightly above the temperature of solidification, and at least one deoxidizing element (aluminum, silicon or manganese) should be present in an amount which will also be in approximate chemical equilibrium with the oxygen present in the steel at a temperature slightly above the temperature of solidification.

Under this ideal condition a steel of given carbon content will have a minimum capacity for absorbing gases at the high welding temperature. Its capacity will increase as the carbon is oxidized out. The formation of carbon monoxide will cease before the metal solidifies and there will be a minimum change in the amount of gas solvent elements such as manganese, silicon or aluminum. Such steel should therefore have the best arc welding characteristics.

Proper Content of Mn, Si and Al

To determine what manganese, silicon and aluminum content in steel imparted to the steel the best welding characteristics, the analyses of the steels that produced welds practically free from porosity were plotted against the carbon content, as shown in Fig. 3.

The curve for aluminum is not plotted from actual analytical data taken during these tests. Analyses for aluminum were made on several samples used in these tests in accordance with the Bureau of Standards method. This method is admittedly not accurate to more than plus or minus 0.01 per cent. No satisfactory welds were obtained on any aluminum killed steel which showed by analysis more than 0.018 per cent total aluminum.

It was found by Mr. Brinell that an addition of a given amount of aluminum to steel was as effective in preventing the formation of gas holes in steel castings as about 10 times that amount of silicon. In view of the above and the difficulty of an accurate determination of aluminum in steel, the curve for aluminum was drawn in as 10 per cent of the values of silicon shown in Fig. 3.

It is evident that the proper control of aluminum in steel plates, sheets, filler rods, or electrodes for welding should be left to the steel maker. The inaccuracy of an analytical determination of aluminum makes it impractical to include limits for aluminum in steel specifications. However, the deleterious effect of a slight excess of aluminum is so great that it must be carefully controlled in the manufacture of steel for electric arc welding.

The values indicated in Fig. 3 for manganese and silicon are considered to be ideal values. Permissible tolerances have not been accurately determined. The data would seem to indicate that the following tolerances could be permissible:

	Per Cent
Manganese, plus or minus.....	0.10
Silicon, plus or minus.....	0.015
Aluminum, plus or minus.....	0.01

The oxygen curve in Fig. 3 is taken from the carbon oxygen equilibrium curve at 1595 deg. C. by Herty and others. By the use of this oxygen curve the curves for silicon and manganese were checked against the manganese oxygen equilibrium curve by Oberhoffer and Schenk and the silicon oxygen equilibrium curve by Herty and Fitterer.

The close conformity of these curves with the individual equilibrium curves established by the various investigators indicates that the equilibrium theory furnishes a correct basis for the manufacturers of steel of good electric arc welding quality.

Other things being equal, the tendency for gas holes to form increases with the speed of welding. As arc welding speeds are being stepped up the importance of the proper quality of arc welding steel for plates, filler rods and electrode material becomes increasingly important.

Conclusions

1. Aluminum oxides or any other non-metallic inclusion in steel which has its melting point between the melting point and boiling point of steel will cause slag holes, or pits, in the weld metal of electric arc welded steel unless it is fluxed with some other material which lowers the freezing point below that of the steel.

2. Aluminum, silicon, manganese, or any other deoxidizers having gas solvent properties which are present in excess of the quantity necessary for chemical equilibrium with the oxygen present in the steel at a temperature slightly above the temperature of solidification may cause the formation of gas holes in the weld metal of electric arc-welded steel.

Discussion by F. T. Llewellyn[1]

MY discussion is based on investigations made by the metallurgical department of the Carnegie Steel Co. That company, as a manufacturer of considerable tonnages of steel intended for fusion welding, is particularly interested in developing steel most suitable for this purpose. It cooperated with the author of the paper just read by furnishing about 350 samples of plate steel of various compositions ranging from dead soft to approximately 0.50 per cent carbon. During the course of Mr. Stine's investigations its laboratories examined a number of specimens of fused beads and welds submitted by the Lincoln Electric Co.

Mr. Stine's method of judging welds, as described by him, was an examination of the surface for appearance, and the fracture of a portion of the weld to determine porosity. The investigation at the Carnegie laboratories consisted of complete chemical analyses, microscopic etching of sections through the welds, microscopic study of the plate and weld metal, and X-ray examination of the welds.

The Carnegie findings as to the quality of the welds were not always in accord with Mr. Stine's classification. It was observed that samples of the same steel, welded at different

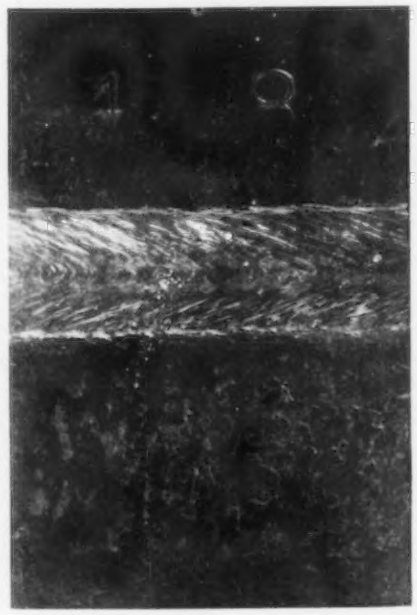


Fig. 2.—Weld in steel of analysis C 0.20 per cent, Si 0.021 per cent, S 0.029 per cent, P 0.016 per cent, Mn 0.44 per cent. Good welding quality.

[1] United States Steel Corpn., 71 Broadway, New York.

times under the carbon arc, and presumably under the same conditions as to current, voltage and speed, did not always produce welds of the same appearance and soundness. The results pointed to factors other than variations in the steel, such as humidity and other atmospheric influences, as well as the efficacy of the shielding of the arc. On account of this contradictory evidence the Carnegie metallurgists could not accept Mr. Stine's conclusions as to the effect of the different elements in steel on its welding qualities.

Following the release of the Lincoln-Stine equilibrium curve, some users of welding steel started to specify compositions conforming to this curve in respect to manganese, silicon and aluminum, which were neither commercially producible nor in accord with previous experience as to what was most desirable from the standpoint of weldability, combined with other essential properties. Many of the welding fraternity apparently did not realize that this curve was intended by its author to apply only to the carbon arc method of welding where no flux is used and that, even if correct for that method, it would not be applicable where a metallic electrode or a flux is employed, since the fused metal does not then have the same composition as the material being welded.

The Four Carnegie Heats

To obtain definite information as to the effect on weldability of varying amounts of manganese, silicon and aluminum in conjunction with several percentages of carbon, four heats of steel were secured by the Carnegie metallurgists having varying carbon and manganese content, and ingots from each of these heats were treated during teeming in five different ways, thus giving 20 different combinations of chemistry and treatment. The four heats are identified in the figure by the Roman numerals I, II, III and IV, and the figure also shows their ladle analyses. The different deoxidizing methods, identified by the letters A, B, C, D and E, are listed in the lower part of the figure.

Each ingot was rolled into plates, 65 in. wide and ½ in. thick, and an 18 x 18-in. specimen, representing the middle of the ingot, was taken midway between the center and edge of each plate for these experiments. A transverse strip, 1½ in. wide, was cut from each specimen for microscopic examination and complete chemical check analysis. Micrographs and analyses of all samples are on record as a part of the complete investigation.

The 20 specimens were tack-welded so as to build up a continuous plate approximately 28 ft. long, the direction of rolling conforming to the length of this plate. Five beads were then fused on the surface of the plate by running a welder at five different

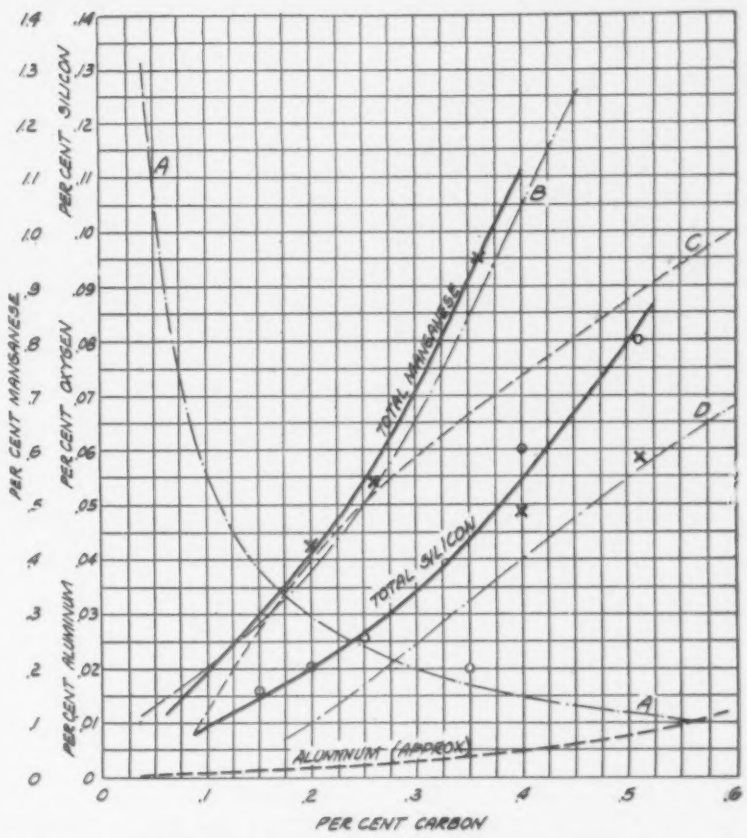


Fig. 3.—Curves indicating aluminum, silicon and manganese content of steel of optimum arc welding characteristics as determined by welding tests.

Curve A.—Carbon oxygen equilibrium curve at 1595 deg. C. from Herty and others.
Curve B.—Manganese oxygen equilibrium curve from Oberhoffer and Schenk.
Curve C.—Total silicon oxygen equilibrium curve from data by Herty and Fitterer.
Curve D.—Free silicon-oxygen equilibrium curve from Herty and Fitterer.

speeds over the full length of the built-up plate. To determine the effect of a simple flux, half of each specimen was painted with sodium silicate (water glass) prior to depositing the beads. A Lincoln tractor-type carbon arc welder with shielded arc was used to deposit the beads. The potential was about 40 volts in all cases. The speeds and current used were as follows:

Speed (In. per Min.)	Amperes
25	450 to 550
20	425 to 450
15	350 to 400
10	250 to 300
8½	200 to 250

Photographs of the surface and exographs[2] of all the specimens are on

RESULTS OF LINCOLN TESTS OF WELDING QUALITY

Sample No.	101	1020	1021	1015	1016	1045	1050
Steel maker	A	B	B	C	C	B	B
Heat No.	....	43581	32507	7331	7331	....	....
Furnace	O.H.	O.H.	O.H.	O.H.	O.H.	O.H.	O.H.
Recarbonized	Yes	Yes	Yes	No	No	Yes	Yes
Deoxidizer:							
Furnace	....	....	....	Spg.	Spg.	....	....
Ladle	Mn	Mn	Mn, Si	Mn	Mn	Mn	Mn, Si
Mold	No	No	Al	Al	No	....	No
Aluminum used, oz. per ton.	0	0	1.5	....	0	....	0
Analysis:							
C	0.20	0.19	0.21	0.14	0.14	0.48	0.51
Mn	0.44	0.60	0.52	0.75	0.75	0.74	0.59
S	0.029	0.027	0.034	0.111	0.111	....	0.035
P	0.016	0.018	0.020	0.016	0.016	....	0.025
Si	0.02	0.02	0.07	0.012	0.012	0.20	0.08
Cu	0.03	....	....	....	....	....	....
Al	....	....	0.005	0.116	0.014	....	....
Ni	0.02	....	....	....	....	....	....
Size—thickness in in.	3/8	3/8	1/2	3/8	3/8	3/8	3/8
Welding:							
Amperes	300	300	300	300	300	300	300
Volts	38	38	38	38	38	38	38
Speed, in. per min.	15	15	15	15	15	15	15
Porosity	0	1 to 2	3	4 to 5	1 to 2	5	1
Appearance	good	good	good	poor	good	poor	good

[2] The term exographs refers to pictures made with X-rays, as opposed to radiographs which are made with gamma rays.

record as a part of the complete investigation, but on account of limited space only a few typical results can be presented here in detail.

To determine the relative merits of the different methods of deoxidizing these ingots in regular production, full-size plates, 480 in. long, 63½ in. wide and 0.281 in. thick, were rolled from the 10 special ingots III and IV, and these plates were made into 20-in. pipe electrically welded by the metallic arc process with very thick flux. No unusual conditions were noticed in welding any of these plates. All of the welds, including those deoxidized with large amounts of aluminum or silicon, were acceptable, but, in contrast with the carbon arc results, a rigid inspection showed that for this metallic arc welding method the E treatment was the best. It also showed that for this method the C and D were better than the A and B treatments.

A further and more extensive examination was made of the welded pipe representing steel killed by treatments C and D. Eight to 12 in. of weld from each of these pipes were explored with a cutting torch and the welds were found to be sound. Tensile and bend tests were also made which showed the welds to be strong and ductile.

In addition to these experiments a record was kept by the National Tube Co. of the relative quality of the metallic arc fusion welds on 3527 plates, with silicon content varying from practically 0 to 0.088 per cent, used in the commercial welding of pipe in 40-ft. lengths at its Christy Park Works during the months of July and August, 1931. The welded joints developed good tensile strength and ductility. Their findings were that, for their particular metallic arc welding process, steel containing approximately 0.06 to 0.08 per cent silicon, which averages more than three times the percentage called for by the Lincoln-Stine curve, was far superior to steels containing lesser amounts of silicon.

1

The standard method of open hearth melting was followed. Spiegel was used in each heat to deoxidize the bath at the proper time before tapping. No silicon or aluminum used in either furnace or ladle.

HEAT NO	MILL NO	LADLE ANALYSIS			
		C	Mn	P	S
I	43332	.13	.40	.013	.035
II	50262	.13	.57	.019	.033
III	27246	.23	.39	.019	.030
IV	43334	.27	.64	.018	.035

Five ingots from each heat were treated in the mold as follows:

Ingot

A - Rimmed: no aluminum, silicon, or other deoxidizers added

B - Killed with 11.6 oz. aluminum per ton

C - Killed with Excessive aluminum, 53.5 oz. per ton

D - Killed with 50% ferrosilicon to give .15 silicon in steel

E - Killed with 50% ferrosilicon to give .05 silicon in steel, and 5.8 oz. aluminum added per ton

Details of the four heats which were the basis of the Carnegie Steel Co.'s investigation.

Conclusions

1. Careful check analyses of a large number of rimmed heats of steel, to which no aluminum or silicon was added as a deoxidizer, show that the limits prescribed for aluminum by the Lincoln-Stine equilibrium curve are not commercially attainable.

2. In the case of the rimmed steel A ingots, where no deoxidizer was used, the two heats, III-A and IV-A (0.22 to 0.27 per cent carbon), produced beads of good appearance and soundness. The reverse was true of the two heats I-A and II-A (0.12 to 0.16 per cent carbon).

3. Steels from the C ingots, which were killed with aluminum to show a content considerably in excess of what is generally present in ordinary steels manufactured under recognized good practice, produced beads having pits or slag holes along the edges. The use of a simple flux, such as sodium silicate, corrected these defects.

4. In the case of heats I and II, containing 0.12 to 0.16 per cent carbon, a 0.20 per cent variation in manganese, ranging from 0.40 to 0.60 per cent, had no effect on the appearance or soundness of the fused beads.

5. In the case of heats I and II, of all the methods of deoxidation tried, steel from the E ingots, killed with silicon to show 0.05 per cent silicon in the finished steel and 5.8 oz. aluminum added per ton, while not conforming in composition with the Lincoln-Stine curve, under the carbon arc produced beads of the best appearance and soundness.

6. In the case of heats III and IV, containing 0.22 to 0.27 per cent carbon and 0.40 to 0.60 per cent manganese, steel from the D ingots, killed with silicon to show 0.15 per cent silicon in the finished steel, while not conforming to the Lincoln-Stine curve, under the carbon arc produced beads of the best appearance and soundness. On the other hand, for welds made by the particular metallic arc process employed, steel from the E ingots proved to be the best. These also do not conform to the Lincoln-Stine curve.

7. Of all the compositions investigated under the carbon arc, steel containing 0.22 to 0.27 per cent carbon and 0.60 to 0.70 per cent manganese gave the best results as to appearance and degree of porosity.

Summary

The best beads under the carbon arc, from the standpoint of appearance and degree of porosity, were obtained on steel having considerably higher manganese and silicon contents than are prescribed by the Lincoln-Stine equilibrium curve. The limits for aluminum shown on the curve were also found to be much too low. All the steels tried, including those to which no aluminum was added as a deoxidizer, contained aluminum in excess of the amount called for by the curve. While aluminum, very greatly in excess of that present in ordinary steels, caused slag holes and pits in beads fused on bare steel, these defects were overcome by the use of a simple flux.

Mr. Stine states in his paper that no satisfactory welds were obtained on any aluminum-killed steel containing more than 0.018 per cent aluminum. This percentage is far in excess of the limits shown on his curve, and is more than is usually found in ordinary steel killed with aluminum. The curve for aluminum, as plotted by Mr. Stine, is not based on either theoretical or experimental data, but merely on a statement by Mr. Brinell that aluminum is ten times as effective as silicon in preventing the formation of gas holes in steel castings. From present knowledge of the effect of deoxidizers, for equilibrium conditions the aluminum curve should coincide with or be only slightly under the silicon curve. This is confirmed by the results of the Carnegie Steel Co. investigation.

In plotting his diagram, Mr. Stine treated each element separately by independent equilibrium curves, neglecting to take into account the mutual interaction of the several elements on each other. Also in his investigation he did not consider the fact that only the free portion of these elements affects equilibrium conditions, and that a large part of these elements may be chemically combined.

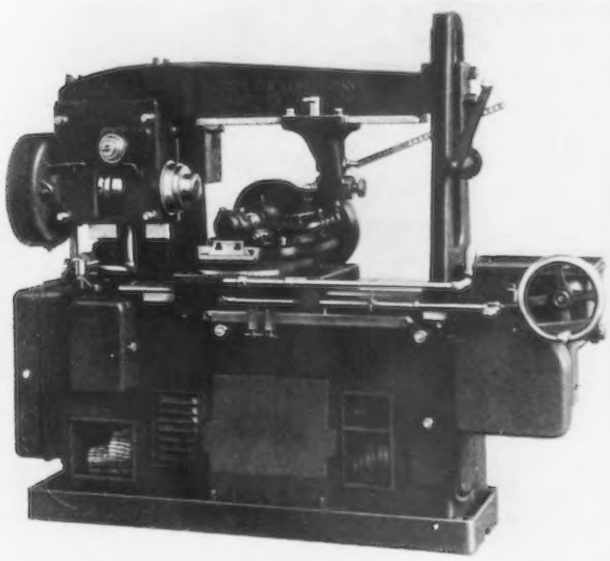
The Carnegie Steel Co. investigation shows that, while there is a relation between composition and weldability, this relation is not correctly exhibited by the Lincoln-Stine equilibrium diagram, and is not as simple as the curves plotted by Mr. Stine would indicate.

Dr. Herty's Views

IN a discussion on the Lincoln-Stine curves that occurred at a meeting of the American Welding Society in Boston, Sept. 24, 1931, Dr. C. H. Herty, Jr., physical chemist, Pittsburgh Experiment Station, United States Bureau of Mines, who is quoted in Mr. Stine's paper, wrote as follows:

The premise is that certain equilibrium conditions exist in the liquid metal in the

(*Concluded on page* 1260)



ALL bearings are lubricated by a one-shot oiling system. Other features include a rapid unloading device for the tailstock, wormgear index drive adjustable for wear, and an anti-backlash "stabilizer."

Improved Gear Hobber Provides Increased Capacity and Accuracy

AN improved gear hobbing machine, designated as Type A, is offered by the Barber-Colman Co., Rockford, Ill., as providing increased accuracy and greater capacity than its predecessor, the No. 12 hobber, the larger capacity referring both to diametral pitch and length of loading on the arbor. Maximum diametral pitch is 3 in. cast iron and 4 in. steel. The new machine will handle gears having a maximum diameter of approximately 12 in. and up to 12 in. width of face.

Mounted in double opposed bronze bearings, the horizontal work spindle can be adjusted to maintain correct clearances at both ends and to avoid excess play in both work and index worm gear. It is made of forged crucible steel and has a 1 17/32 in. hole enlarged to a No. 12 B. & S. taper at the front to receive the work arbors which are held in position by a draw-in bolt. The work spindle slide, carried on taper gibbed ways, is adjustable by an elevating screw with micrometer dial reading to 0.001 in. This slide carries the index worm and worm gear mechanism in a cast iron case. The overarm, a box section casting, is bolted securely to the work spindle slide.

A feature of the overarm bracket or tailstock that supports the outer end of the work arbor is a rapid unloading device. By moving the lever on the upright, the bracket is quickly moved out of the way when the work is changed. To push the tailstock bracket up to the end of the arbor it is only necessary to turn the handle in the other direction and hold it until the bracket is clamped.

The indexing mechanism is the same as that of the No. 12 machine, namely, a worm and worm gear on the work spindle slide. An improved device is used for adjusting for wear between the worm and worm gear, the adjustment being made by screws that move the gear guard case in such a way as to take up any clearance that may occur between worm and gear.

After the hob becomes dull in one position, it can be relocated by means of a screw with micrometer dial that moves the hob spindle slide lengthwise. This independent slide, which is clamped to the swivel by taper gibs, carries the alloy-steel hardened and ground hob spindle in Timken bearings. The hob slide swivel accommodates a range of helical settings 50 deg. either side of zero, and a vernier reading to 10 min. assures accuracy of setting.

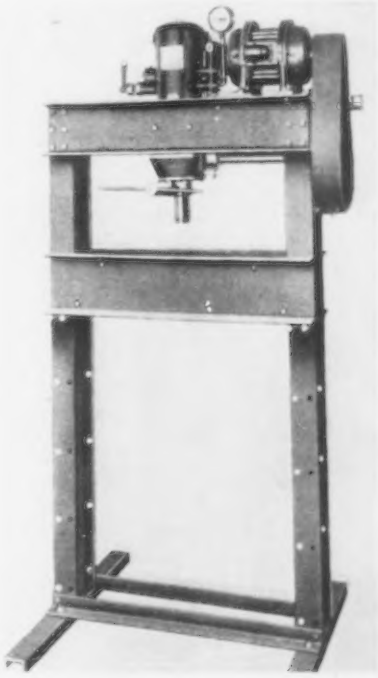
To eliminate backlash in the feed screw and to prevent the slide from jumping when the hob chatters in the work, an automatic "stabilizer" is provided. This is a braking device that gives a steady frictional drag on the hob swivel slide. It can be disconnected when desired by pulling out a small knob on the front of the bed casting—a convenience when traversing the hob swivel by hand as when setting up new jobs. The resistance or drag, which is caused by two friction disks and three metal plates held against each other by a heavy helical spring, is only in effect as the hob swivel slide moves in its cutting direction. The additional load on the machine caused by the action of the stabilizer is said to be so slight as to be practically negligible.

Traverse of the hob swivel slide is actuated through gearing in the feed box located on the right-hand end of the bed. The box has a self contained cascade oiling system. Through index change gears, speed change gears and automatic stops, the machine can be set for various series of operations. Stops on both feed and rapid traverse are provided and there is another stop which automatically throws out the clutch on the main drive at the end of the cut. The machine is driven through silent chain by a 5-hp., 1700-r.p.m. motor adjustably mounted in the base under the upright.

Eight hob speeds are available ranging from 45 to 220 r.p.m. Other specifications include: distance from center of work spindle to overarm surface, 8 in.; to hob spindle center line (maximum), 8¾ in.; hob swivel slide travel, 17½ in.; diameter of hob spindle, 1¼ in.; maximum diameter of hob, 4 in.; range of feed, 0.015 to 0.150 per revolution of work; rapid traverse, 70 in. per min. The machine occupies 60 x 100 in. floor space and weighs approximately 5635 lb.

Hydraulic Presses for General Utility

HAND-OPERATED and motor-driven Hannifin-Vickers general utility hydraulic presses in 20, 40 and 60-ton sizes have been brought out by the Hannifin Mfg. Co., 621 South Kolmar Avenue, Chicago. The entire operating mechanism, including cylinder, pumps, valves, and reservoir, is



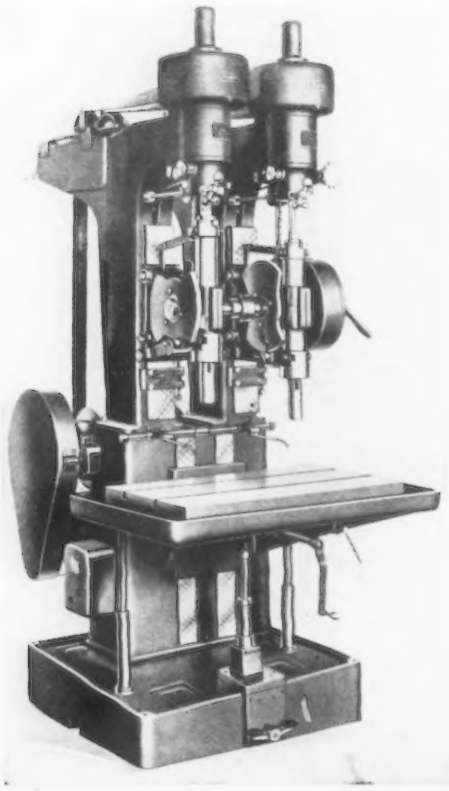
combined in an integral unit which can be furnished separately as well as with the frame as illustrated. Power units can also be supplied mounted on an open gap frame. The standard frames are designed so that the motor drive can be added later, if desired. The company builds a line of high speed hydraulic presses up to 100 tons capacity in three sizes—two-column, four-column and open gap types.

Ball-Bearing Drilling Machines with Single or Multiple Spindles

◆ ◆ ◆

IMPROVED ball-bearing drilling machines in both motor-spindle and belt-driven types, one to six spindles, and equipped with either power or cam feed have been placed on the market by the Charles G. Allen Co., Barre, Mass. A built-in tapping device can also be furnished.

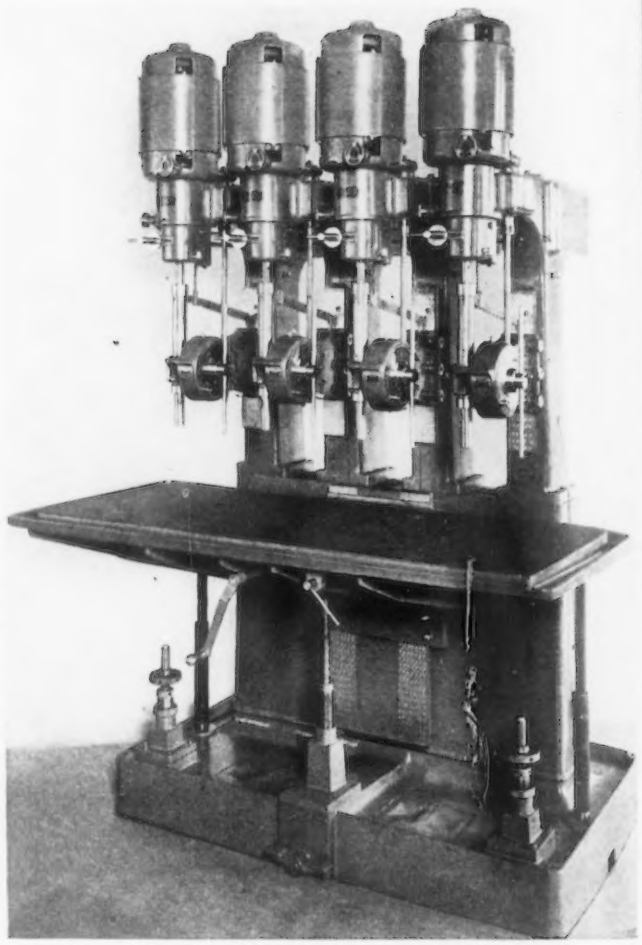
Motor-spindle machines of the No. 2 size are powered by constant-torque motors wound for four speeds in two distinct ranges: 600, 1200, 1800 and 3600 r.p.m., or 600, 900, 1200 and 1800 r.p.m. Motors can be obtained for operation on 220, 440 or 550 volts, three-phase, 60-cycle alternating current. Heat treated back gears of the sliding type provide four additional spindle speeds in any reduction ratio up to a maximum of 4 to 1. The back gears are ball bearing equipped. A dial on the front end of the controller shaft indicates to speed being used, either direct or back geared. An automatic interlock prevents shifting the back gears except when the controller is in the "off" position. Standard equipment includes individual motor protection and an inclosed magnetic switch operated by the foot treadle at the front of the base for starting and stopping all spindles.



▲ ▲ ▲

THE No. 2 motor-spindle drilling machine at right is equipped with power feed and back gears. Spindles are spaced on 12½-in. centers. A two-spindle No. 3 belt-driven machine fitted with cam feed is illustrated below.

▼ ▼ ▼



A typical machine of belt-driven type is the No. 3 here illustrated. It is rated at 1¼-in. drilling capacity in steel, but is designed to have power and speeds suitable for boring, reaming and spot facing operations up to 2½-in. diameter, also for corresponding drill head requirements. Four spindle speeds are provided by two-step cone pulleys on spindle and back shaft; speeds are changed and belt tightened by means of levers accessible from the front or rear of the machine. Four slower speeds are obtainable through built-in back gears offered as extra equipment.

No sleeve bearings are employed in the drive. The alloy steel multiple splined spindle rotates on heavy-duty radial thrust bearings, fully inclosed in the quill which is 3 in. in diameter and made of alloy steel with the rack cut directly in the steel sleeve.

Power feed is applied through hardened and ground worm gearing which, like the rack pinion, is mounted on ball bearings. Pulling down on the hand lever engages the power feed; raising the lever reverses it. The feed clutch is of the balanced three-shoe toggle friction type self adjusting for wear. There is a graduated dial for positive depth knockout, with cushioned quick return. Four feeds (eight on back-geared machines) are selected by turning a knurled handwheel at the front of the head.

With the cam feed mechanism no rack is provided on the spindle quill; downward and upward motion of the spindle is controlled by a plate cam on the horizontal pinion shaft and a roller and lever attached to the spindle quill. Cams can be staggered for alternate loading of each spindle.

Specifications of the No. 3 belt-driven machine include: sliding head traverse, 10¼ in.; spindle traverse in sliding head, 8 in.; table movement on column, 14¼ in.; maximum distance, spindle to table, 23¼ in.; center to center of spindles, 15 in.; center of spindle to column face, 12 in. Net weights range from 2500 lb. to 10,600 lb. for the single and the six-spindle machine, respectively.

▲ ▲ ▲

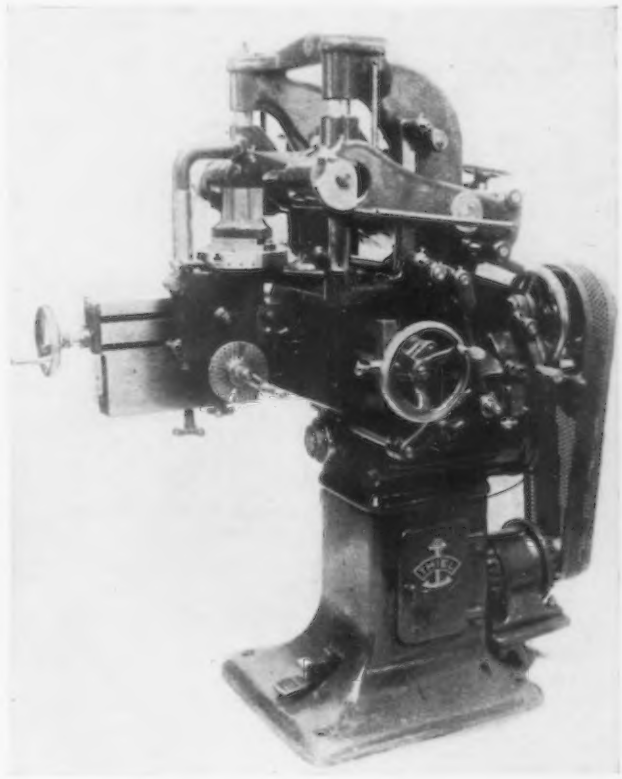
Skip Hoists for Coal and Ash Handling

A COMPLETE line of skip hoists and accessory equipment has been placed on the market by the Fairfield Engineering Co., Marion, Ohio. These skips are available in capacities from 4 to 300 tons per hour, with bucket sizes from 10 to 150 cu. ft., and with bucket speeds ranging from 50 to 300 ft. per min. They are built with unbalanced, counterweighted, or balanced type buckets and with either full-automatic or semi-automatic control. To meet every condition of service, two distinct types of skip loaders are built—the weight-operated type and the bucket-operated.

Vertical Shaper for Punch and Form Cutting

IRREGULARLY shaped punches and similar work can be produced by means of the Thiel vertical form shaper here illustrated, which has been placed on the American market by Marburg Brothers, Inc., 90 West Street, New York. The new shaper is designed to cut one-piece punches at a considerable saving of time, handwork being necessary only on small and intricate shapes.

Cuts are made with an ordinary shaper tool, which, after completing its downward stroke, swings back and produces the supporting shoulder of the punch. The radius of this shoulder is adjustable to a minimum of ½ in. A quick-change gear box provides three speeds for cutting various types of material and giving various degrees of finish. The length of stroke can be varied from 1½ to 4 in.



PUNCHES are accurately cut by the downward strokes of an ordinary shaper tool which swings back at the bottom of stroke to produce a curved shoulder.

The work is mounted on the faceplate of a dividing head having an index plate of the milling machine type to permit accurate shaping of arcs. The power cross feed of the work has a maximum travel of approximately 8¾ in. and is adjustable from 0.006 to 0.017 in. in either direction. All adjustments are convenient to the operator, being located on the right-hand side of the machine. The starting and stopping pedals connect with a friction clutch. Gages are furnished for use in setting the cutting tool.

In operation, the form can be worked to scribed lines or to a templet soldered on to the end of the work. Chips are thrown to the rear by the rocking motion of the tool at the end of its stroke and thus do not endanger the operator. The machine is driven by a 1-hp. motor.

Boiler Designed for Drier Steam

A NEW multiple-circulation boiler developed by the Combustion Engineering Corpn., 200 Madison Avenue, New York, departs from the conventional design in two essentials—tube arrangement and steam liberation. The tubes in the first pass are arranged so that half of them enter the front drum and the other half enter the middle drum. Half the tubes in the second pass enter the middle drum and the other half enter the front drum.

This tube arrangement effects a double circulation in the boiler. One circulation is up half the tubes in the front tube-bank to the front upper drum, then down the tubes running into the middle tube-bank to the lower steam-and-water drum. The other circulation is up the other half of the tubes in the front tube-bank which run into the middle upper drum, then down half the tubes in the middle tube-bank to the lower steam-and-water drum.

This splitting of the circulation results, it is stated, in equalizing the steam liberation in the upper front and middle drums and thus eliminating the intense turbulence present in the conventional types of multi-drum bent-tube boilers, in which the greater part of the steam is liberated in the front drum—consequently, the many disadvantages which accompany such turbulence are also eliminated.

To assure dry steam production, more steam circulators are used. The steam circulators are connected from both the front drum and the middle drum directly into the rear drum. This design, it is said, effects two improvements—drier steam and lower steam velocities.

This boiler is available in sizes ranging from about 2000 sq. ft. to 26,000 sq. ft. of heating surface.

Building permit reports received by the Bureau of Labor Statistics, United States Department of Labor, Washington, indicated an increase of 6.4 per cent in the number of buildings and a decrease of 29.2 per cent in the estimated cost of buildings for which permits were issued during September, as compared with August. Government contracts, totaling $10,331,688, were let during September.

Spiral Two-Lipped End Mills

SPIRAL two-lipped end mills with straight shank are new items added to the small tool line of the Brown & Sharpe Mfg. Co., Providence, R. I. The spiral teeth provide a greater cutting area said to be highly desirable for certain cutting operations and to increase the cutting efficiency of the end mill. Left-hand

end mills have a left-hand spiral, right-hand mills having a right-hand spiral.

The end mills are made of high speed steel and a complete range of sizes is offered with diameters ranging from ¼ to ¾ in. The straight shank is the same diameter as the cut taken.

Surface Grinder With Full Hydraulic Action

HYDRAULIC table reciprocation and cross feed of wheelhead are provided. The coolant tank is separate from the base and mounted on wheels for convenience in cleaning or filling.

WORK up to 12 in. wide, 40 in. long and 16 in. high can be handled on the hydraulic surface grinding machine illustrated, a new product of the Thompson Grinder Co., Springfield, Ohio. A special dressing device can be furnished to permit contour grinding. The table of the machine is reciprocated under the wheel in a longitudinal direction only; it is actuated by a hydraulic cylinder and may be reversed either by table dogs or manually at any point of its stroke. The wheelhead is traversed hydraulically across the work at both ends of the table, reverse being controlled by a valve which is variable and reversible.

The standard wheel (10 in. diameter, 3 in. wide, with 5-in. hole) is carried on a chrome-nickel steel spindle which revolves in scraped, adjustable bronze bearings at front and rear. End thrust is taken by a hardened thrust collar on the spindle. A precision balanced 5-hp. motor rotor is keyed directly to the spindle, thus eliminating vibrations. The grinding spindle speed is 1725 r.p.m.; peripheral speed of grinding wheel, 5400 ft. per min.

Cross feed to the head is hydraulic and automatic; feeds may be obtained from 1/32 to 2 in. per reverse, thus permitting fast removal of stock at high speeds. The wheelhead is also equipped with a hydraulic dressing valve that permits continuous travel of the head in either direction and at any speed desired. This valve may also be used for rapidly traversing the head from or to the work and in positioning the grinding wheel. The workhead may be raised or lowered by means of a hand wheel in the carriage. A micrometer index permits increments of .00025 in. to be obtained.

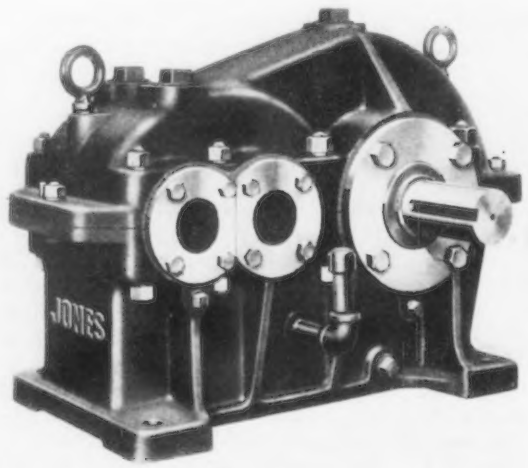
The table oil pump, located in the base, is driven by a 3-hp. motor with V-belt drive. A generator of sufficient capacity for a full size magnetic chuck may also be mounted in the base and driven from the same motor. The entire mechanism is mounted on a heavy ribbed base, which is insulated from the base of the machine by vibration absorbing material. Grinding head and table drive motors are separately controlled by push buttons and protected by overload relays.

All functions of the table are controlled through one lever located in the valve panel in the front of the base. The table has an infinite speed range from 20 to 100 ft. per min. Lubricant for the table ways is provided by small tubes from the main valve. The table is reversed by adjustable dogs and may be operated at extreme speeds without dwell at the ends and without shock.

All ways are accurately scraped; vertical ways have adjustable taper gib. All the working parts are heat treated and ground. The table is provided with ½-in. standard T-slots for mounting magnetic chuck or work. Splash guards are bolted to the table, as the machine is primarily intended as a wet grinder. The coolant tank is located outside at the rear of the machine and is mounted on wheels to facilitate cleaning or refilling. Floor space required is 55 in. front to back by 112 in. long for extreme travel of the table. Net weight is 7000 lb.

Speed Reducers for Small Motor Drives

A NEW double-reduction herringbone-Maag speed reducer for small motor drives has been developed by W. A. Jones Foundry & Machine Co., 4401 West Roosevelt Road, Chicago. In design, construction and manufacture, these small machines are the same as the company's heavy-duty reducers.



Double helical gears, accurately generated right and left hand, in effect a herringbone gear with a wide gap, are used for the initial, or high-speed, reduction. The low-speed reduction consists of an accurately generated Maag pinion and gear. Timken bearings are used throughout, assuring complete anti-friction mounting. Capacities range from 1 to 12 hp., and an extensive list of ratios is carried in stock.

New Hard Alloy for High-Speed Machining of Steel

Non-Cratering, Non-Shattering Characteristics Are Important Features—High Speeds and Light Feeds Give Best Results

THE placing on the market by Thomas Prosser & Son, 15 Gold Street, New York, of a new cemented carbide for the machining of steel was announced in THE IRON AGE of Nov. 5, page 1217. Further information relating to the application and performance of this new hard alloy, which was developed by Friedrich Krupp, Essen, Germany, at the request of the Prosser company, has since been made available.

While full details of the composition are not yet disclosed, it has been learned that the new material, which is called Widia "X" by the Krupp company, contains a rare metal not previously used. It is manufactured by coating the cutting particles with a softer material which acts as a binder, thorough mixing to obtain a homogeneous and uniform mass, pressing together under great hydraulic pressure in a mold, and finally sintering at high temperature in an inert atmosphere in an electric furnace. This cementing process, similar to that employed in making Widia tungsten carbide, produces a uniform product free from blow holes or other defects. It is understood that patents covering the new material are being applied for by the Krupp company.

As stated in the previous item, this Widia "X" was developed at the request of the Prosser company to permit the cutting of steel at speeds as great as those which can be obtained on cast iron or non-ferrous materials with cemented tungsten carbide. The new tool is not offered as taking the place of tungsten carbide, however, but rather as supplementing existing tool materials.

The tip and shank can be copper brazed by the same methods employed for the tungsten-carbide tools, although the complete tools as made by the Prosser company at its Detroit and Garwood, N. J., plants are said to embody shank steel of special grade and to be brazed by a special process intended to overcome many of the difficulties encountered with tipped tools. Application of the new hard alloy to lathe-type tools and milling cutters, as well as tool angles, are as far as known at present the same as with Widia cemented tungsten carbide. The forms of the tips and the price are also the same.

Same Grinding Methods Used

Grinding is at least as easy as with tungsten carbide, and the same wheels and methods are applicable. In some cases it is necessary to grind chip breakers in the new tools; when this is done care should be taken not to hollow grind the chip breaker, but rather to grind it parallel to the top surface of the tool with a small radius at the back to form the chip.

An outstanding feature of the new hard alloy is said to be the almost complete elimination of cratering action, the cupping out of the top of the tool caused by the pressure and abrasion of the chip coming off the work, which was formerly so destructive to cutting tools. It is stated that the chips seem to slide off the surface of the new material with ease and are cut clean with no tearing action, resulting in less friction. The work remains cooler and a much better finish is produced.

Increased speeds in cutting steel, from two to five times greater than those with high-speed steel tools, are said to be possible with the new Widia. It is emphasized, however, that the new alloy is not to be considered a cure-all; it is essentially a high-speed material, and best results will be had where the cutting speed can at least be doubled, using reasonably light feeds.

An important feature is that in case of accident, such as sudden stopping of the machine with the tool in the cut and the feed on, or where the tools are tested to destruction, and breakage occurs, usually only a small amount of grinding is necessary to put the tool in good condition. It is not necessary to purchase new equipment to make use of the new tool, states the Prosser company, provided machines can be speeded up to take advantage of the greatly increased cutting speeds possible.

Extensive laboratory and field tests have been made to determine practical operating characteristics. The results of some of these tests, as reported by the Prosser company, are as follows:

On a chrome-nickel steel corresponding to S.A.E. 3335, Widia "X" was run at a speed of 197 ft. per min., a feed of 0.060 in. and depth of cut of 0.40 in. After 5 min. use it was removed from the lathe; when examined under a microscope, no wear or cratering was discernible. A Widia cemented tungsten-carbide tool under the same speed, feed and cut, showed appreciable cratering after 1¾ min. use. The color of the chip made by the new tool indicated that much less heat was generated, and the chip came off the steel without any tearing action, indicating a finer finish.

Tools Operate at 1250 R.P.M.

In facing both ends of a machine steel bushing for a motion picture projector—material highly ductile and difficult to cut—the new tools are run at 1250 r.p.m., as against 280 r.p.m. of high-speed steel. With the latter, the time per piece was 1 min. and with the new tools the time is 16 sec. The new tools have cut 4700 pieces without grinding, as against 200 per grind with the steel tools, and are being set for another job without grinding. The piece was held to a limit of 0.0004 in.; straight cutting oil was used.

In turning S.A.E. 1315 steel at 359 ft. per min., which was the maximum capacity of the lathe, the new tool ran for 15 hr. before regrinding, another hard alloy tool requiring grinding every 6 hr.

On a very old lathe the new tool cut 1800 pieces of steel measuring 1⅞ in. in diameter and 1 5/16 in. long before regrinding. Regrinding required the removal of only 0.010 in. of the carbide. The depth of cut was 0.055 in.

A test in milling S.A.E. 1020 steel, 18 in. long and 3½ in. high, showed long life between grinds. In a series of successive cuts, starting at 150 ft. per min., 9-in. table feed and 1/16-in. depth of cut and ending at 387 ft. per min., 42-in. table feed and 1/16-in. depth of cut, the new tool made 20 more cuts at the highest speed than the other hard alloy tools tested with it.

▲ ▲ ▲

Copper, brass and bronze are extensively used in various features of construction of the new Department of Commerce building in Washington, about 2,000,000 lb. of these metals having been applied, according to data obtained by the Copper and Brass Research Association. Bronze gates adorn the entrances, while bronze doors add to the impressiveness of the lobbies. Bronze is also used for hardware and lighting fixtures in the building's 3000 rooms. About 600,000 lb. of brass pipe is installed to assure a rustproof water supply. Brass is also used in strips for dividing off about 16 acres of terrazzo flooring in two-foot squares. The roof is flashed with copper and the downspouts are made of the same metal.

Canalization of Rivers Is Urged by Valley Mills

YOUNGSTOWN, Nov. 10.—United States Army engineers are considering data presented by representatives of communities in the Beaver, Mahoning and Shenango Valleys in behalf of the proposed canalization of the three rivers. The burden of the argument advanced is that water transportation is essential to the continued growth of the Youngstown district, because of the advantages of cheaper transportation enjoyed by competing districts. President Frank Purnell of the Youngstown Sheet & Tube Co. said that his company is prepared to expend large sums for harbors and terminals and needed loading and unloading equipment, in the event the canal is created.

Data were presented to Major Wilhelm D. Stayer, chief of the Army engineering staff at Pittsburgh, and his staff officers. The engineers expect to complete their report in about a month. It was emphasized that industries in the three Valleys now suffer from disadvantageous freight rates as compared with other iron and steel producing centers.

A report submitted by J. C. Argetsinger, general counsel, Youngstown Sheet & Tube Co., said that the three rivers could originate more than 15,000,000 tons of freight, although the 19 rivers tributary to the Ohio in 1929 originated only 33,000,000 tons, of which 28,000,000 tons was originated by the Monongahela.

"It is evident, therefore, that these three could produce more tonnage than all of the other Ohio River tributaries combined, excepting the Monongahela River," he declared. "The improvement of waterways serving other districts has retarded the progress and prosperity of this district. Its rivers are navigable but unused."

▲ ▲ ▲

Contractors See Chance for Business Recovery

Convinced that business recovery is within the grasp of the American people if well considered recommendations are "promptly translated into action," as urged by President Hoover's Emergency Organization on Unemployment Relief, the Associated General Contractors of America, Munsey Building, Washington, has mobilized for an aggressive campaign for nation-wide adoption of a program promulgated at the recent meeting of the association's governing board, Edward J. Harding, managing director, has announced.

The board's program includes, among others, recommendations for maximum expenditures of local, State and Federal funds that can be immediately raised to undertake a constructive program for America; extension of the powers and functions of the Federal Reserve System so as to release hoarded capital; general revaluation of construction securities; extension of Federal aid, similar to that now accorded the States for highways, to provide needed schools, hospitals, eleemosynary institutions, etc.; the issuance of State bonds for public buildings as well as highways; enactment of legislation prohibiting the competition of prison labor with free labor and the entering of the Government into competition with its citizens; the certification of construction so that more liberal financing terms may be arranged; and the licensing of contractors and the establishment of credit bureaus to determine their responsibility.

▲ ▲ ▲

New Agency Appointed For Royal Dutch Iron

William H. Muller & Co., 122 East Forty-second Street, New York, have been appointed exclusive selling agents in the Eastern and Southern sections of the United States for pig iron of the Koninklijke Nederlandsche Hoogovens en Staalfabrieken at Ymuiden, Holland. The Royal Dutch pig iron was imported for some years by Pilling & Co., Philadelphia, whose business is being liquidated. The new selling agents for the iron announce that stocks will be carried at convenient locations to supply prompt shipments.

▲ ▲ ▲

Testing Society Holds Sectional Meeting

The second meeting of the New York metropolitan section of the American Society for Testing Materials was held at the Paramount Hotel, New York, Nov. 5. The first meeting was held March 5, 1931, as an experiment to inaugurate such a series. (THE IRON AGE, March 12, 1931.) The meeting last week was attended by about 350 and was preceded by a dinner served to 217 in the Paramount grill.

The topic for the meeting was "Non-Metallic Coatings." There were three speakers: Dr. Maximilian Toch, president, Toch Brothers, Inc., New York, on "The History of Protective Coatings"; Dr. Henry A. Gardner, American Paint and Varnish Association, New York, on "The Economics of Paint," and Dr. James K. Hunt, E. I. duPont De Nemours & Co., on "The Failure of Non-Metallic Coatings."

The meeting was arranged by the committee of the New York section, of which F. M. Farmer, vice-president and chief engineer, Electrical Testing Laboratories, New York, and past-president of the society, is chairman.

Safety Engineers Elect Dr. M. G. Lloyd, Chairman

American Society of Safety Engineers, engineering section, National Safety Council, has elected Dr. M. G. Lloyd, United States Bureau of Standards, Washington, as chairman. New vice-chairmen are S. E. Whiting, Liberty Mutual Insurance Co., Boston, and H. S. Smith, Union Carbide & Carbon Corpn., New York. W. Dean Keefer, National Safety Council, Chicago, has been reelected secretary, and Gene S. Wood, American Society of Mechanical Engineers, New York, has been named assistant secretary. The executive committee for three years consists of Cyril Ainsworth, American Standards Association, New York; E. F. Blank, Jones & Laughlin Steel Corpn., Pittsburgh, and J. E. Culliney, Bethlehem Steel Co., Bethlehem, Pa. F. W. Rosseland, Newark Safety Council, Newark, N. J., has been named on the executive committee for one year to fill the unexpired term of E. L. Hewitt, resigned.

▲ ▲ ▲

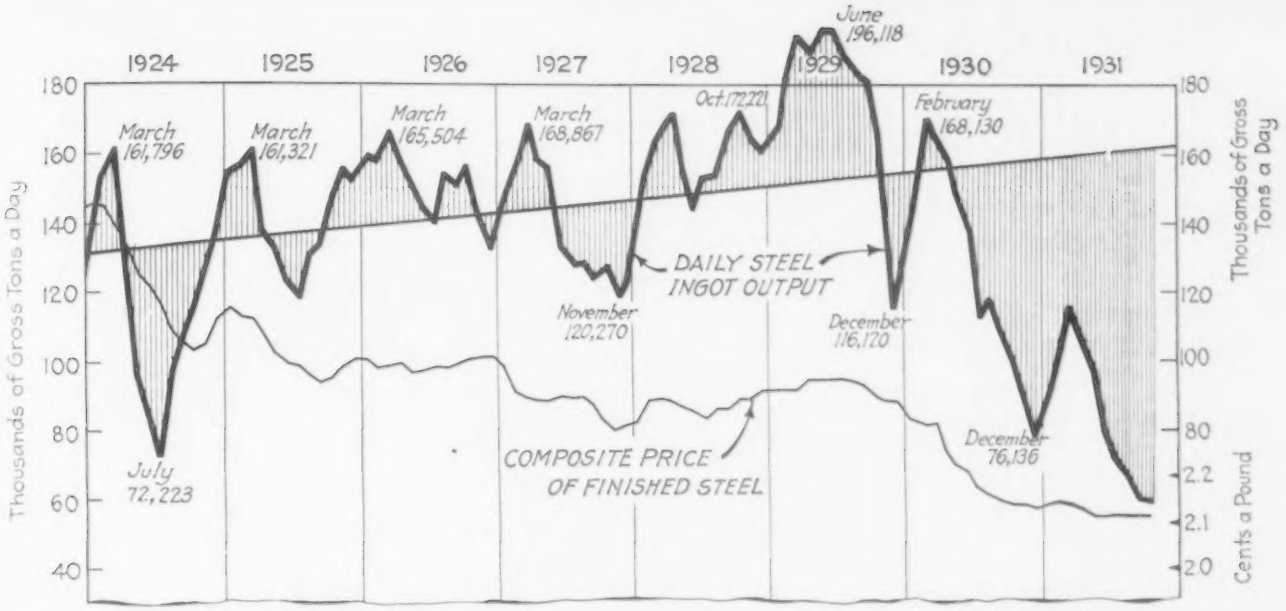
Inspection Engineers Form Association

The National Engineering Inspection Association, recently organized, has published a booklet on tentative methods of procedure in inspection work. The materials dealt with in this publication are structural steel for buildings and bridges, T and girder rails and accessories, steel plate pipe, hot-rolled or drawn steel and iron pipe, boiler and firebox steel, cast iron pipe and specials, cement, concrete, timber, piles, poles and ties.

Purposes of the association are "to promote a proper understanding and cooperation among those engaged in and concerned with engineering inspection; to establish practices which will prove beneficial to proper service, and to develop and encourage better and more effective inspection methods."

The association plans eventually to adopt standard methods of procedure for the inspection of virtually all engineering materials, either separately or in groups, for which recognized manufacturing standards, such as those of the American Society for Testing Materials, the American Standards Association or other industrial or regulatory bodies are in commercial use. A code of ethics outlining the proper methods to be employed by members in their business relations with each other has been adopted by the association.

Officers are Watson Vredenburgh, president, 122 Greenwich Street, New York, and B. H. Witherspoon, P. O. box 1115, Pittsburgh, secretary and treasurer, from whom copies of the above-mentioned booklet may be obtained.



Ingot output in October showed practically a stoppage of the decline, but the total was the smallest for any month since 1921. Prices averaged the same as in August and September.

Steel Ingot Production About Stationary

PRODUCTION of steel ingots in the United States in October is reported by the American Iron and Steel Institute at 1,592,376 gross tons, compared with 1,547,602 tons in September. As there were 27 working days in October against 26 in September, the October daily average showed a further drop of about 1 per cent, although, as in the case of pig iron, the month's total tonnage was slightly higher in October.

This is the first sign of an upturn since March, when a total of slightly less than 3,000,000 tons was made. The drop from that has been practically 47 per cent.

On the daily basis, production is reported at 58,977 tons, or at the rate of 27.76 per cent of capacity as of Dec. 31 last. This compares with 59,523 tons in September and 28.02 per cent operation. The daily rate is the lowest for any month since September, 1921, when 51,619 tons was made.

Compared with September, October shows an increase in reported open-hearth ingots almost equivalent to the extra working day. Bessemer tonnage, on the other hand, shows a falling off of nearly 2 per cent from September, constituting only 12.9 per cent of the total of open-hearth and Bessemer steel in October against 13.5 per cent in September.

In ten months, output is calculated at 22,004,112 tons, a reduction of 37.3 per cent from the 35,094,520 tons in the first ten months of 1930. Open-hearth tonnage in ten months fell off 36.6 per cent and Bessemer tonnage 39.9 per cent.

Electric and crucible ingots are not included in these figures. In 1930 they constituted 0.8 per cent of the total ingot output.

PRODUCTION OF OPEN-HEARTH AND BESSEMER STEEL INGOTS
(Gross Tons)

	Reported by Companies Which Made 95.21 Per Cent of the 1930 Ingots		Calculated Output of All Companies		No. of Working Days
	Open-Hearth	Bessemer	Monthly	Daily	
Total, 1929	44,101,321	7,091,680	54,312,279	174,639	311
1930					
January	3,157,761	441,572	3,778,235	139,935	27
February	3,335,428	508,618	4,035,111	168,130	24
March	3,513,269	539,616	4,254,331	163,628	26
April	3,405,671	509,234	4,109,492	158,057	26
May	3,265,353	528,968	3,982,915	147,515	27
June	2,849,079	407,586	3,418,535	136,739	25
Six months	19,526,561	2,935,594	23,578,619	152,120	155
July	2,430,128	353,723	2,922,220	112,393	26
August	2,541,367	374,467	3,060,763	117,722	26
September	2,275,910	429,975	2,840,379	109,245	26
October	2,165,341	399,704	2,692,539	99,724	27
Ten months	28,939,307	4,493,463	35,094,520	134,979	260
November	1,807,133	300,339	2,212,220	88,489	25
December	1,659,026	226,786	1,979,547	76,136	26
Total, 1930	32,405,466	5,020,588	39,286,287	126,322	311
1931					
January	2,044,298	296,620	2,458,689	91,063	27
February	2,085,529	296,972	2,502,366	104,265	24
March	2,504,060	346,139	2,993,590	115,139	26
April	2,275,404	316,668	2,722,479	104,711	26
May	2,083,833	301,639	2,505,485	96,365	26
June	1,736,109	246,365	2,075,910	79,843	26
Six months	12,723,233	1,804,403	15,258,519	98,442	155
July	1,570,776	225,030	1,886,153	72,544	26
August	1,462,720	174,380	1,719,462	66,133	26
September	1,274,321	199,151	1,547,602	59,523	26
October	1,320,158	195,943	1,592,376	58,977	27
Ten months	18,351,208	2,598,907	22,004,112	84,631	260

National Economic Council Bill to Be Introduced

Senator LaFollette Assured of Considerable Support in Congress for His Measure to Alleviate Depressions

WASHINGTON, Nov. 10.—Apparently pleased that prominent industrial, business and financial figures either indorsed or did not strongly oppose his measure to establish a National Economic Council, Senator LaFollette of Wisconsin has definitely decided to urge passage of the bill at the next session of Congress, which convenes Dec. 7.

The subcommittee of the Senate Committee on Manufactures, which conducted hearings on the bill, has given assurance of its support. This means it likely will be one of the first pieces of legislation received by the Senate. For it is believed Senator LaFollette has correctly predicted that the full committee will indorse the bill.

To say that the bill will be enacted, however, is quite another thing. But it promises to have formidable support and there appears a possibility of its enactment. One reason for this belief is that the alinement of the new Congress is such that the "balance of power" may easily rest with a remarkably small minority. It is altogether probable that the throwing of only a few votes for or against a measure will assure either its defeat or its passage, so narrow will be margins between the two old parties.

"Blocs" will perhaps have their innings as never before, and the forthcoming session, which promises to be lively and hectic, will see them under full steam. They may be expected to assume all sorts of formations. Working together in some instances, they likely will be shifted from time to time and recast in other instances, and working against each other.

Another condition which lends support to such a measure as the proposed National Economic Council is that, regardless of its practical value, panaceas for the depression have become popular and afford opportunity for political activity.

Yet this sort of activity works both ways, and actually may be a saving grace for business. For the eagerness to find remedies to lift the depression no doubt will result in many panaceas being urged, and one may definitely counteract the other. Meanwhile, if business recovery sets in and proceeds on sure ground, legislation of this kind will lose its favor and therefore its political status. The country would then automatically be relieved of this kind of disturbance from Congress.

The administration has not denoted its attitude toward the LaFollette bill, but there are many who believe that President Hoover would not favor it because it smacks too much of the unnecessary projection of government into business, which always has met the strong opposition of the President. Moreover, the administration is expected to have a program of its own to assist business which will provide for government cooperation with business but not government interference, one designed to let business help itself rather than getting tangled up with governmental strings. Broadly, the administration program apparently will take the direction of further plans for relieving credit conditions, with perhaps a reasonable provision for additional public works operations.

It is nevertheless considered remarkable that of the prominent figures in the industrial, financial and business life of the nation who appeared as witnesses at hearings on the LaFollette bill none expressed really strong opposition to it.

▲ ▲ ▲

ETCHED Allegheny metal and black lacquered steel have been used to give a decidedly modernistic appearance to an elevator inclosure in the Blackstone Apartments, Milwaukee. The installation was made by the Globe Wire & Iron Works, Milwaukee, after its own design.

Welding Conference to Be Held at Minneapolis

A conference and demonstration of modern welding methods will be held at Minneapolis, Nov. 19-21, under the joint auspices of the Northwest chapter of the American Society for Steel Treating and the Manufacturers Association of Minneapolis. Sessions will be held in one of the new buildings of the Caterpillar Tractor Co.

At the opening session the evening of Nov. 19, Stuart Plumley, chief engineer, Smith Welding Equipment Corpn., Minneapolis, will discuss the "New Code for Welded Pressure Vessels," and F. G. Outcalt, engineer, Linde Air Products Co., Chicago, will speak on the "Testing of Welds." Friday's sessions will include papers on "Hard Surfacing," by Mr. Plumley, and "Automatic Welding" by W. B. Brady, General Electric Co. Following an informal complimentary dinner, G. O. Forseth, Lincoln Electric Co., will speak on "The Shielded Arc, both Manual and Automatic," and A. F. Huna, Air Reduction Sales Co., will present a paper on "Bronze Welding and Cutting."

"Shop Welding Machinery," by W. W. Reddie, Westinghouse Electric & Mfg. Co., and "Lindewelding—a New Technique of Pipe Welding," by F. G. Outcalt, are papers planned for Nov. 21.

Demonstrations of both gas and electric welding, cutting and hard surfacing will be given and modern equipment and methods will be shown in connection thereto. These demonstrations will include bronze welding of cylinder blocks, welding of malleable iron, steel, chrome alloys, aluminum and other material.

A feature will be the question box; visitors may write out questions on any phase of welding and the questions will be answered at the close of the morning sessions. Alexis Caswell, 100 Builders Exchange, Minneapolis, is secretary of the manufacturers association.

▲ ▲ ▲

Foreign Steel Goes to Chicago

The Norwegian steamer Rein, from Antwerp, has docked at Chicago with steel channels, 31,100 reels of barbed wire and 19,783 rolls of wire netting.

▲ ▲ ▲

University of Wisconsin Extension Division, Madison, Wis., is offering home-study courses in cupola practice and foundry metallurgy, under the direction of Ben G. Elliott, professor of mechanical engineering. Information regarding these courses can be obtained from the University Extension Division at Madison.

OFF THE ASSEMBLY LINE

Gain in Automobile Production Expected Late in November

▲▲▲

DETROIT, Nov. 9.

DESPITE the recent improvement in sentiment in Detroit, which has been further supported by the more optimistic outlook in agriculture, the automobile industry is not entertaining any illusions about an immediate emergence from the depression. One must dig deeply into the records to discover a month when production was as low as in October, which is estimated at 86,328 cars. Moreover, it now seems unlikely that assemblies in November will be much greater than in October. Any gain probably will come from Buick, Chevrolet and Ford, but at the present writing it appears that Buick is the only company whose schedule is sure to show a considerable betterment this month.

That motor cars must be manufactured in time for dealers to have at least small stocks during the January shows is acknowledged, and therefore December is sure to see an upward turn in the production curve. Indications are that expansion of output will start about Nov. 15, with a slow acceleration during the remainder of the year. Production in the United States and Canada in the first nine months of 1931 was 2,196,690 units; the final quarter's performance is estimated at 325,000 to 350,000 units. This means that the output for the entire year should be near 2,525,000 units, compared with 3,510,178 units in 1930, a decline of 29 per cent.

Ford Program Still Delayed

Interest continues to center in the plans of the Ford Motor Co. When it will launch its program of manufacture of the improved model A is a question which is perplexing even those companies with large Ford orders. These suppliers are anxiously awaiting shipping releases before beginning production and, in turn, are holding up their own steel releases. Ford is understood to have completed all work on the current model A and now is devoting sole attention to preparations for the new car. One reason assigned for the delay in the manufacture of the revamped car is the realization of the futility of trying to force a new product on the public just now, when seasonal dullness is sharply accentuated by the depression; another reason is the desire to give dealers an opportunity to clean out present stocks.

The mayor of Dearborn the past week announced that the Ford company has promised to give employment to all idle workers in that city during the winter, so that Dearborn is one municipality which can boast that it has no unemployment problem. The change-over at the Rouge plant is being made with reasonable speed, despite the impatience of suppliers to get under way. It is still believed that the program of making 62,000 cars the remainder of the year and 70,000 in January will be adhered to.

October motor car output in United States and Canada estimated at 86,328 cars. Production in November is expected to show only a slight gain over October, any improvement coming from Buick, Chevrolet and Ford.

* * *

Fourth quarter assemblies put at 325,000 to 350,000 units. Total output for entire year should be near 2,525,000 units, compared with 3,510,178 units in 1930, a decline of 29 per cent.

* * *

Chevrolet has no definite quota this month, but 40,000 cars scheduled for December. New Buick will be announced next Saturday. Ford suppliers are still waiting for shipping releases on orders before starting production.

* * *

Tendency toward streamlining of bodies, further simplification of transmission and lower prices will be outstanding features of 1932 cars.

▼▼▼

Chevrolet Has No Quota for November

Chevrolet's plans are taking shape slowly. The latest report is that no definite quota of cars has been set for November, the number of assembled cars depending on the progress made in getting the 1932 production lines running smoothly. The motor department at Flint and numerous other manufacturing divisions are now turning out parts. The gray iron foundry worked three and a half days last week. It is reported that the company's December schedule calls for 40,000 to 45,000 cars. It is assumed that Chevrolet intends to announce its car in December, as it did last year.

The various Chrysler divisions are in no hurry to produce new cars, and there is little indication that their output in November will be sizable. Since they are not likely to announce new models until the New York show, they probably will mark time this month and resume operations on a considerable scale in December. Among the changes said to be in the making is a new body design for the Plymouth. As its chief competitors will be exhibiting new cars, it seems logical that Plymouth should make a fresh bid for favor in this manner. Hudson is about ready to begin work on a modest scale; the management is reported in the most optimistic frame of mind in several years. It is no secret that the 1932 cars will carry a body differing materially from the present one and embodying many smart features. Hudson is

eager to regain lost ground and recent changes at the factory point to the fact that it is sparing no effort to achieve this purpose.

Wizard Control Is Buick Feature

The new Buick featuring "wizard control" is to be shown to the public next Saturday. Wizard control incorporates three outstanding improvements, the automatic clutch, new and advanced free wheeling and silent second synchro-mesh transmission. The automatic clutch makes possible swift easy shifting of all gears without using the clutch pedal. Buick will offer 26 models on four wheelbases. Bodies are said to be of modified stream-line design. Prices are the lowest in Buick's history, showing a decline from last year's level. The Buick plant at Flint is now making about 450 to 475 cars a day, five days a week; this pace will be maintained or possibly increased as the month progresses. Buick shipped 5012 cars in October. Oakland-Pontiac will not start its assembly lines until Nov. 23. The foundry began work today and the motor and sheet metal departments will get under way next week. Cars will not be announced until January. The Auburn factories at Auburn and Connersville, Ind., are down for inventories, with light operations planned this month. It is thought that many producers will not attempt to "beat the gun," preferring to wait until the New York show. In this group will be the Chrysler companies, Auburn-Cord, Oakland-Pontiac, Oldsmobile, Willys-Overland, Cadillac-LaSalle and Hupmobile. There is a possibility that Studebaker may bring out its car in December. George Graham has announced that the new light-priced six to be built in Detroit will be called the Rockne, as predicted in this column several weeks ago. Sponsored by Studebaker, the Rockne will be an assembly job, with all parts purchased outside or manufactured by Studebaker at South Bend.

The first serious trend toward streamlining will be noticed in the 1932 lines of several prominent automobile companies, according to J. Ledwinka, chief engineer of the Budd Body Co. This will be especially pronounced in the treatment of the fronts of cars so as to offer less wind resistance at high speeds. From a mechanical standpoint next year's cars will see special attention paid to transmissions to make shifting of gears easier. It is also believed that prices of most cars will be lower than in 1931, since the cost of materials has dropped sharply.

▲▲▲

Comprehensive Program for A. S. M. E. Meeting

With more than 25 technical sessions at which some 75 papers and reports will be presented, the annual meeting of the American Society of Mechanical Engineers, to be held at the Engineering Societies Building, New York, Nov. 30-Dec. 4, will offer a program of comprehensive interest.

At a joint meeting of the machine shop practice and applied mechanics divisions, on Nov. 30, O. F. Gechter and H. R. Laird will describe an "Improved Device for Recording Instantaneous Tool Pressures in Machinability Studies." Photoelastic developments will also be outlined, the papers and authors being as follows: "Kinematography in Photoelasticity," by M. M. Frocht; "Photoelastic Study of Shearing Stresses in Keys and Keyways," by A. G. Solakian and G. B. Karelitz; and "Celluloid as a Medium for Photoelastic Investigation," by R. H. G. Edmonds and B. T. McMinn.

"Elements of Milling," by Prof. O. W. Boston and C. E. Kraus will be a feature of the metal cutting session on the afternoon of Nov. 30. A progress report on "Tungsten Carbide and Other Hard Cutting Materials" will be presented by Coleman Sellers, 3rd, for the A. S. M. E. subcommittee on metal-cutting materials, and a motion picture of outstanding machine tools at the recent Leipzig Trade Fair will be shown.

"Machine-Design Management," a paper by J. L. Alden is planned for the morning of Dec. 1. At the same session, devoted to casting and machine design, Alex Taub will discuss "Correlation of Design and Foundry." Two meetings have been arranged by the applied mechanics division, one of them to include an analysis of "Stresses in Railroad Track," by S. Timoshenko.

A symposium on business stabilization, with addresses by Virgil Jordan and J. W. Hook, has been planned for the morning of Dec. 2, and, engineering economies, with papers on "Economic Life of Equipment," by H. O. Vorlander and F. E. Raymond and "Dividend Programs Related to Depreciation," by E. G. Field, will be discussed in the afternoon. Discussing management research has been arranged for the morning of Dec. 3; papers will include "Coordination of Research and Engineering with Production and Sales," by C. L. Bausch and the "Coordination of Research, Sales and Production," by R. F. Wilder.

"Rustless Steel Conveyors" by N. W. Elmer and the "Application and Design of Floating Drive for Conveyors," by N. H. Preble will be among the papers at the materials handling session on Nov. 30.

Steel mill bearings will be discussed at a symposium on the morning of Dec. 3; the following five papers will be presented: "Straight Copper-Lead Alloys vs. Solid Solution Bronzes for Heavy-Duty Bearings," by F. R. Hensel and L. M. Tichvinsky; "Millwright Bearings for Roll Necks of Medium-Sized Rolling Mills," by K. W. Atwater; "Water-Lubricated Soft-Rubber Bearings," by W. F. Busse and W. H. Denton; "Application of Celeron Bearings to Roll Necks," by A. J. Schmitt; and "Application of Tapered Roller Bearings in Merchant Bar Mills," by S. M. Weckstein. "Recent Developments in Merchant Bar Mills" will be discussed by G. L. Fisk at the metal rolling session on the afternoon of Dec. 3.

Industrial and central station power, oil and gas power, hydraulics, fluid meters, lubrication research and engineering, education and training for the industries are other topics on the program. The Towne lecture will be delivered by W. B. Donham, dean, Graduate School of Business Administration, Harvard University, on the afternoon of Dec. 1 and the Thurston lecture, on psychology and engineering, by Dr. E. L. Thorndike, professor of education, Columbia University, on the afternoon of Dec. 3. The business meeting, president's reception and dance, annual dinner, conferring of awards, college reunions and other activities are also on the program.

▲▲▲

National Founders To Meet Next Week

The National Founders' Association will hold its thirty-fifth annual meeting at the Hotel Astor, New York, on Nov. 18 and 19. The customary banquet will be omitted this year as an economy measure.

The opening session Wednesday will include reports of the president, S. Wells Utley, Detroit, and the commissioner, A. E. McClintock, Chicago. "The Modern Trend in Handling People" will be the subject of an address by A. D. Lynch, director of personnel, Ohio Brass Co., Mansfield, Ohio. At the luncheon session Dr. Gerald Wendt, New York, will deliver an address on "This Synthetic Age."

Subjects to be presented in addresses at the Wednesday afternoon session are: "The Crisis in Social Policy," by James A. Emery, Washington; "Signs and Portents," by Marc A. Rose, editor of *Business Week*; "What's on the Worker's Mind in 1931," by Whiting Williams, Cleveland; "Russia—a Menace or an Opportunity," by John L. Lovett, general manager, Michigan Manufacturers' Association, Detroit.

Thursday's session, to be concluded about 1 o'clock, will have two special features, an address on "The Selective Application of Castings," by R. A. Bull, director, Electric Steel Founders' Research Group, Chicago, and an address on "Modern Handling Methods in the Foundry," by H. L. Hoefman, engineer, Link-Belt Co., Chicago. Reports of committees and election of officers will follow.

... PERSONALS ...

W. C. HEATH, whose resignation as vice-president in charge of manufacturing, Fairbanks, Morse & Co., Beloit, Wis., was noted in these columns on Nov. 5, has been appointed vice-president, A. O. Smith Corpn., Milwaukee, in charge of research, engineering and production. He assumed his new duties Nov. 2. Mr. Heath attended the University of Wisconsin and then was graduated from Lewis Institute.

❖ ❖ ❖

ROBERT T. STEINDORF, associated with the engineering staff, Chain-Belt Co., Milwaukee, since his graduation from Purdue University, in 1924, has been promoted to engineer in charge of the sanitation equipment division of the company. This division manufactures a wide line of equipment for sewage disposal plants, industrial waste disposal, water treatment and sewage treatment.

❖ ❖ ❖

T. P. ROBBINS was elected president of the Cleveland Hardware Co., Cleveland, Nov. 9, succeeding C. E. ADAMS, who became chairman of the board. Mr. Robbins was formerly treasurer. H. S. SHERMAN was elected secretary and MALCOLM MCBRIDE, treasurer. E. E. ADAMS, vice-president and manager, has retired.

❖ ❖ ❖

C. F. HERINGTON has been made sales engineer for the Grindle Fuel Equipment Co., a subsidiary of the Whiting Corpn., Harvey, Ill. During the last nine years Mr. Herington has been affiliated with Heyl & Patterson, Inc., Pittsburgh, and previous to that he was with the New York Central Railroad, the Pennsylvania Railroad and Westinghouse, Church, Kerr & Co.

❖ ❖ ❖

CHARLES V. FRANKLYN, for many years representative of the Colonial Steel Co., Colona, Pa., in the Midwest territory and more recently of the Braeburn Alloy Steel Corpn., Braeburn, Pa., has been appointed special representative of the Cyclops Steel Co., Titusville, Pa. He will sell all Cyclops products, including tool steels, stainless, non-corrosive and heat-resisting steels, and will have headquarters at 1302 South Seventh Street, St. Louis.

❖ ❖ ❖

GORDEN LEFEBVRE, until recently vice-president in charge of operations of the Oakland Motor Car Co., has organized the consulting engineering firm of Gordon Lefebvre & Co., Detroit, specializing in all phases of manufacturing, costs, machine design, construction and finance. He has had a long experience in production work in the automotive industry.

W. C. HEATH

❖ ❖ ❖

HARRY W. DIETERT, research engineer of the United States Radiator Corpn., discussed foundry control as the guest of the New England Foundrymen's Association on Nov. 11.

❖ ❖ ❖

PROF. T. R. LAWSON, head of the department of civil engineering, Rensselaer Polytechnic Institute, Troy, N. Y., has been elected vice-president of the American Society for Testing Materials by the executive committee to fill the vacancy caused by the death in August of S. T. Wagner, consulting engineer, Reading Co., Reading, Pa., who was made vice-president at the annual convention in June.

❖ ❖ ❖

T. D. LYNCH, consulting engineer, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., retired from active service on Nov. 5 after a continuous term of 32 years. He expects to spend the winter in Florida and return in April to his home at Edgewood, Pa., where he will be available for consultation.

❖ ❖ ❖

ROY V. WRIGHT, president, American Society of Mechanical Engineers, addressed a meeting of the Cleveland section held at the Statler Hotel, Nov. 5, taking for his subject, "Shall the Engineer Be a Lion or a Mouse in World Economics?" The address was preceded by a dinner.

❖ ❖ ❖

WILLIAM J. KOEHRING, vice-president, National Equipment Corpn., Milwaukee, and president of its principal subsidiary, Koehring Co., has been elected president of the National company to fill the vacancy caused by the death of his brother, Philip A. Koehring. He has been in charge of production of the Koehring Co. since its establishment in 1910, and supervisor of production of the National corporation since its formation in 1928 as a merger of his company with five others manufacturing highway construction machinery.

▲ ▲ ▲

Colorado Fuel Finds New Ore Deposit

DENVER, Nov. 9.—The discovery of a large body of high-grade iron ore by Colorado Fuel & Iron Co. is said by company officials to be one of the most important of its kind in this country in years. The discovery was made near its Sunrise, Wyo., iron ore mines. Messages from Sunrise describe the find as one of the richest yet uncovered there. Colorado Fuel already has taken 14,000,000 tons of ore from its Sunrise property, and the new body will probably yield millions of tons more and will make it unnecessary for the company to depend on outside sources for its future supply of raw materials. The new body of ore is just north of the big Colorado Fuel mine at Sunrise, and the property will be developed as soon as possible.

Workers at the scene of the discovery said that drills have gone through 300 or 400 ft. of the ore, which is of higher grade than any ever opened in that territory and ranking with the best grade ore in the country.

▲ ▲ ▲

Iron and Steel Through the Panama Canal

Shipments through the Panama Canal from the Caribbean Sea to the Pacific consists more largely of manufactures of iron and steel than of any other products. In the fiscal year ended June 30 last, these manufactures constituted just short of 20 per cent of the total Pacific-bound cargoes. This compares with somewhat higher figures in the three preceding fiscal years, reaching about 24 per cent in 1929.

If tin plate, which is carried separately in the Government report, is included, the 1931 total reaches 1,544,382 gross tons, or 23.1 per cent of the 6,680,429 tons passing through.

Other iron and steel materials not included above were 139,928 tons of machinery in the 1931 year, 104,002 tons of automobiles (exclusive of accessories), 77,839 tons of railroad material and 46,904 tons of scrap metal. All of these items were higher in the preceding years, though the percentage of excess varied considerably.

...OBITUARY...

ROBERT H. RIPLEY, senior vice-president, American Steel Foundries, died Nov. 4 at the Evanston, Ill., Hospital. Mr. Ripley's father, the late Edward P. Ripley, was president of the Atchison, Topeka & Santa Fe Railroad when young Ripley first began the practice of law in Chicago in 1899. The latter became identified with the railway supply business and joined the American Steel Foundries in 1905. The following year he was made a vice-president and in 1929 became senior vice-president. When Robert P. Lamont resigned his industrial position to become Secretary of Commerce in President Hoover's cabinet, Mr. Ripley became chairman of the board of the General Steel Castings Co. He was 55 years old.

❖ ❖ ❖

RICHARD T. CRANE, JR., president of the Crane Co., Chicago, died Nov. 7 in New York after an illness of 10 days. His death occurred on his fifty-eighth birthday. Mr. Crane was a native Chicagoan, his entire business career having been spent in the steam fitting and plumbing supplies company which his father, the late Richard T. Crane, founded in 1855. He was graduated from Sheffield Scientific School of Yale University in 1895 and a year later he entered the works of the Crane Co. He became second vice-president in 1898. On becoming president in 1914 he carried with him the traditions and policies of his father. These included a rare regard for the welfare and comfort of the company's employees. In six years from 1924 to 1930, he made stock gifts totaling $10,000,000 to his employees from his own private holdings.

❖ ❖ ❖

PHILIP A. KOEHRING, president, National Equipment Corpn., Milwaukee, and secretary-treasurer of its principal subsidiary, Koehring Co., Milwaukee, was found dead in his automobile in a field near Mauston, Wis., on Oct. 31. He had been on a business trip to the company's branch at St. Paul, Minn. Mr. Koehring was born on a farm near Kiel, Wis., in 1876, and as a youth became a machinist's apprentice in Milwaukee. He developed the first concrete highway paving unit and in 1910 opened a small machine shop for its manufacture. In 1928 Mr. Koehring effected the consolidation of his company with five other companies in the industry to form the National Equipment Corpn. He served as president of the Milwaukee Association of Commerce in 1926 and 1927.

❖ ❖ ❖

BRUCE C. DAVEY, SR., vice-president of the Denver Mining Equipment Co., Denver, Colo., died in his home at Chicago on Nov. 4. He was 40 years old.

R. H. RIPLEY

ROY W. HEFFNER, vice-president of the Alan Wood Steel Co., Conshohocken, Pa., was killed in an automobile accident in Norristown, Pa., Nov. 3. He was formerly identified with the United Alloy Steel Corpn., Canton, and resigned from that connection to take charge of the building and operation of the Rainey-Wood coke plant in 1918. After the consolidation of the Rainey-Wood Coke Co. with the Alan Wood Steel Co., Mr. Heffner was made vice-president in charge of operations of the coke and mining interests for Alan Wood, and had been recently made a vice-president of the parent company.

❖ ❖ ❖

LEON C. DECKARD, representative in northern Pennsylvania for the Barney Machinery Co., Inc., Pittsburgh, died suddenly on Nov. 1. He had been associated with the company for the past six years.

❖ ❖ ❖

DR. LEWIS T. ROBINSON, engineer in charge of the general engineering laboratory of the General Electric Co., died of a heart attack at his home in Schenectady, N. Y., on Nov. 3. In his boyhood he had been office boy for Prof. Elihu Thomson, from whom he derived the enthusiasm for technical knowledge which started him on his engineering career. Dr. Robinson was 63 years old.

❖ ❖ ❖

HENRY E. NICKERSON, vice-president and secretary of the Congdon & Carpenter Co., Providence, R. I., and widely known in the steel and metalworking industry, particularly in connection with the activities of the National Hardware Association, died at his home in that city on Oct. 9. Mr. Nickerson was born in South Dennis, Mass., Oct. 26, 1858, went to Providence in 1875, and two years later became associated with the Congdon & Carpenter Co.

❖ ❖ ❖

COL. ISAAC NEWTON LEWIS, who invented the machine gun which bears his name, died suddenly of heart disease in the Lackawanna Railroad station in Hoboken, N. J., Nov. 9. He was born in New Salem, Pa., Oct. 12, 1858, and was graduated from the United States Military Academy at West Point in 1884. Colonel Lewis was also the inventor of numerous military instruments and devices now in general use. In 1900 he made a study of methods of manufacture and supply of ordnance materials, in Europe, resulting in complete rearmament of the field artillery of the United States.

❖ ❖ ❖

THOMAS ARCHIBALD DICKINSON, chief engineer of the efficiency department, Youngstown Sheet & Tube Co., Youngstown, was found dead near his home at Poland, Mahoning County, last week. During the World War, he won the Distinguished Service Cross for his exploits as an aviator. He had been with the Sheet & Tube company since 1919, starting as a testing engineer in the steam engineering department.

❖ ❖ ❖

JOHN HAMILTON BORDEN, for many years purchasing agent for the American Radiator Co., died Nov. 1 after an illness of several months. He was 53 years old and made his home in Oak Park, Ill. Mr. Borden was the son of the late Hamilton Borden, founder of one of the first scale companies in Chicago.

❖ ❖ ❖

LOUIS G. HENES, president of the Henes-Morgan Machinery Co., Ltd., Los Angeles, and of the L. G. Henes Machinery Co., San Francisco, died suddenly of heart failure in New York on Nov. 1. After his graduation from Columbia University, he went to the Pacific Coast in 1906 and founded the machinery business with which he was identified at the time of his death.

❖ ❖ ❖

WALTER C. STONE, manager of the Grand Crossing plant, Chicago, of the Republic Steel Corpn., died Nov. 7 at the Mayo Hospital, Rochester, Minn., after a long illness. He was at one time assistant district manager at Cleveland for the American Steel & Wire Co. and later was transferred to Chicago in the same capacity. In 1917 he became manager of the Grand Crossing works, which at that time was a unit of the Interstate Iron & Steel Co.

❖ ❖ ❖

WILLIAM LOUDEN, who founded the Louden Machinery Co., Fairfield, Iowa, 60 years ago, died Nov. 5 in his home in Fairfield after a brief illness. He was 90 years old.

Rise in Commodities Checks Pessimism

BY DR. LEWIS H. HANEY
DIRECTOR, NEW YORK UNIVERSITY BUREAU OF BUSINESS RESEARCH

OUTSTANDING facts revealed by the chart are new low levels reached by Bradstreet's index of commodity prices, by steel scrap and by pig iron—the two latter being monthly averages. The Bradstreet index Nov. 1 is the lowest since 1908. Finished steel prices averaged unchanged in October.

In general, a survey of commodity markets indicates that prices continue highly irregular, with about as many declining as advancing. The rises have been mostly in grains, silver and petroleum. Such important commodities as wool, cotton and cotton cloth, hogs, lard, lead and zinc have continued weak. Most commodities remain practically unchanged.

It is thus not possible to find in commodity prices any clear evidence of inflation. A purely inflationary move in commodity prices would probably be more general than anything so far seen, and would be due to a change in the purchasing power of the dollar. It would thus tend to affect all commodities, though not equally.

Down to this writing, the chief movements in commodity markets appear to have been in the nature of rebounds from an oversold position. The speculative outburst in wheat and silver during the past week or ten days is like a fever flaring up in a sick man. And the way in which it has been fostered by newspapers is little short of deplorable. Rarely, indeed, do such movements end before they have been overdone.

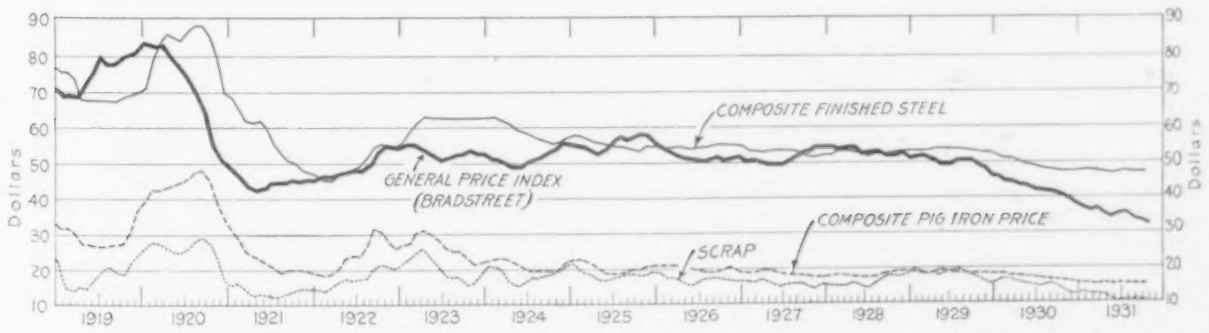
Immediate effects of the rise in wheat, however, will partly be good. It is a desirable service to have checked undue pessimism. Perhaps even the ultra-pessimistic inflationists will now feel that business can recover without deluging the country with new debts. The strength in wheat should also tend to decrease hoarding and to ease the strained condition of rural banks.

Obviously, the rise in wheat and other grains will somewhat strengthen the economic position of farmers, particularly in the Southwest. We do not know how much deterioration the poorly stored wheat on the farms has undergone, nor at what price the farmers will sell, but farm holdings are larger than usual. To the extent that the farmers are able to cash in their present paper profits, they can reduce their indebtedness, thus increasing the general insolvency of the country. Offsetting this point is the fact that serious crop damage is threatened by drouth, which, while it may contribute to higher prices, may not contribute to larger total values.

In the long run, the inevitable reaction in the grain markets may cause a revulsion in sentiment and bring losses to thousands of small speculators. It is inconceivable that such an advance can be long sustained, particularly as there is no economic basis apparent for such a large recovery. The world supply of wheat is more than ample, and the visible supply in the United States is large.

Moreover, the Chicago wheat market is out of line with the world markets, and we are not exporting any considerable amount. At this writing, wheat prices have recovered all the ground lost on the sharp break that began about last March and lasted down to September. It is clearly apparent that wheat prices had become unduly depressed and that the market was oversold. The rebound, however, has already fully compensated the abnormal part of the decline.

In some respects, the silver rise is similar to that in wheat. Production has been curtailed and sales of silver by India apparently have ceased—the latter resembling the temporary cessation of wheat sales by Russia. At prices close to 25c., silver was abnormally low, and a part of the rebound was to be expected. But with the public speculating in silver, following the lead of Chinese speculators, at Shanghai, the thing will be overdone. Vague ideas that gold has lost its position and that, therefore, silver must increase in value are no adequate basis. Probably there is less ground for the gains in silver than there is for the rise in wheat.



There is further spread between the Bradstreet index of commodity prices and the average of finished steel prices. Scrap and pig iron have gone lower; finished steel has not.

W. W. MACON
Editor

THE IRON AGE

A. I. FINDLEY
Editor Emeritus

(ESTABLISHED 1855)

"There Ought to Be a Law Passed"

THUS far the interrogation of manufacturers by Senator La Follette's committee at Washington has brought out little or no reason for the creation of the proposed National Economic Council. Mr. Farrell, according to his testimony reported in THE IRON AGE of Nov. 5, does not see where such a Government bureau could help the steel industry, holding rather the opinion that the industry itself could do better long-range planning than any outside council or commission. One has but to read the questions put to men of long experience and high competence in American industry to conclude that their Senatorial cross-examiners can bring little of either experience or competence to bear upon a situation which it is proposed to cure by passing more laws.

The procedure might well be reversed and these leaders in industry be allowed to explore the Senatorial mind to discover how it proposes to use the La Follette system of "economic planning" to lead industry out of its unparalleled besetments. While the Soviet five-year-plan no doubt inspired the bill which the Progressives in Congress are now sponsoring, the latter are far less specific than the Soviet leaders in outlining what they expect to accomplish through a National Economic Council. We can imagine that any answers they might give, if questioned by the witnesses they have summoned from industry, would be quite as vague and theoretical as the provisions of the La Follette bill itself.

The purpose of the proposed council of 15 members, so far as the bill discloses it, is to regularize employment and operations of the country's "industrial, financial, agricultural and labor interests." Care is taken to avoid any suggestion of the dictatorship that has been set up in Russia, the duties of the council of 15 being to "keep advised" of developments in business, "consider problems," "formulate proposals" and "submit reports." That sounds like a very mild program to emanate from men who have been excoriating the Administration at Washington and all the leaders of industry for failing to give the country speedy deliverance from the distresses of depression. From all that they have said, by way of holding the existing industrial system responsible for what has happened, we have been led to expect they would draft a bill with teeth in it—to speak in terms of the insurgent vocabulary. To our surprise, the new measure proposes only what is now done by the Department of Commerce, the Federal Trade Commission and other Government agencies, to say nothing of the very effective work of hundreds of manufacturers' and trade associations.

But perhaps our surprise is matched by the surprise with which Senator La Follette found that the industrial leaders he summoned to Washington were eminently fair, fully responsive to inquiry and quite as much concerned for the public welfare as those members of Congress who meet every time of stress with the unvarying formula, "there ought to be a law passed."

▲ ▲ ▲

"Business as Usual"

CONCENTRATION on the less favorable indices of business conditions has caused many of the more hopeful underlying conditions to be lost sight of. One of the most favorable of these is the vitality of the commercial structure; it enables many lines of business to go on as usual despite the virtual prostration of many large industries.

In the Pittsburgh district, for instance, where the iron and steel industry is predominant, a large volume of business is being done in spite of the fact that the steel industry is operating at little better than 30 per cent of capacity and other important industrial groups, such as coal mining and glass manufacture, are equally depressed.

According to statistics collected by the Bureau of Business Research of the University of Pittsburgh, and published in the *Pittsburgh Business Review*, more than 1,500,000 freight cars were loaded on railroads serving the Pittsburgh district during the first nine months of 1931, or about 70 per cent of the number loaded in the corresponding period of 1930. In addition a large tonnage was moved by trucks and by water. Electric power consumed by western Pennsylvania industries in the same period amounted to about 85 per cent of the corresponding 1930 total. Department store sales in the first three quarters of this year were 87 per cent of the corresponding 1930 total. Wholesale firms reporting to the bureau did about 76 per cent of their volume in the first three months of 1930 in the corresponding period this year. When allowance is made for price declines over the past year, the physical volume of all sales is much larger than the dollar volume indicates. Life insurance sales in the district during the nine months ended Sept. 30 amounted to about 77 per cent of their corresponding 1930 aggregate.

While it is folly to minimize the effects of the present depression, it is just as unwise to overlook those parts of our business life which are functioning reasonably well.

▲ ▲ ▲

IF freight car requirements for the fourth quarter make a reliable gage, the regions bordering on the Atlantic and Gulf Coasts of the United States are pulling out of the depression in advance of the other

districts. Estimates show the four eastern and southeastern regions calling for 2,074,792 cars, or one-third of the total. This represents a loss of only 1.8 per cent from last year, whereas the nine regions in the interior and on the Pacific Coast lose, collectively, 10.4 per cent. Furthermore, none of the four eastern districts loses as much as 5 per cent; none of the nine western and central regions loses as little as 5 per cent, with the maximum approaching 19 per cent.

▲▲▲

Psychology and Periodicity

LONG ago there was a theory that the observed periodicity of major business depressions might be explained by relating the phenomena to "the life of a business generation." The theory did not have general acceptance but perhaps it had more adherents than any other single theory. In the light of experience of the last few years it looks as if there might be something in it after certain modifications are made. Considering the wide range of ages of men in business, the actual business generation is longer than the cycle period, but there may be a cycle in thought without there being a complete change in personnel.

As to the fact: there were crises in 1818, 1837, 1857, 1873 and 1893, and a 20-year period was selected as "normal." The first period was merely a year short, while the shortness of the 16-year period 1857 to 1873 was ingeniously explained by asserting that the Civil War made things move faster, while it killed or incapacitated many business men. Then there was 20 years from 1893 to 1913. The familiar financial panic was then lacking and there was no long depression, but had it not been for the war there might have been. Then there was 16 years from 1913 to 1929. The shortness of the period might be explained by the World War as the Civil War was used in the other instance.

Of course it may all be accidental, but if so it is a very remarkable accident. No one today is disposed to deny that a few years ago people were too sanguine and that by now they have gone very far in the opposite direction. Then citation of past periods would simply be pointing out that what men have thought and done recently, other men thought and did in the past. It is well to make an effort to consider mental states in the past because there have been strong influences distracting our minds from such attention. The statisticians have paraded many tables and graphs as to prices, quantities, etc., going further and further back in their studies. This magnification distracts attention from mental states of the past, which cannot be studied and presented in similar detail.

The modus operandi is simplicity itself. The "descending spiral" has often been referred to in terms of prices, quantities and employment, but much less often in terms of reactions between mental states and physical conditions. In the purely physical aspect, a factory has reduced demand, thereupon furnishing less employment and buying less. That affects other factories and they in turn others, until the swing gets around to the first factory again.

The reaction between physical and mental is also spiral-producing. The business man sees things getting worse as to volume and prices and acts more cautiously. The physical curtailment his mental state produces brings about in turn a worse mental state, and so on turn about. Eventually the process is stopped and then an ascending spiral begins.

The term "mental state" is here used in its broadest significance. It is dangerous to think too much of the particular mental states of undue confidence and undue fear. There are many other things in the human mind, notions about how hard one should work, how far he should look into his future, what his "living standard" should be, etc., etc.

▲▲▲

Minimums and Maximums in Steel

LATE last spring there was some talk of "irreducible minimums" in steel, along the line that some classes of consumption had gone as low as they could possibly go in taking steel. Subsequent declines in total steel production shot so many holes in that theory that there is little or no mention of it now. We pass over the curious suggestion from a Wall Street source recently, that rust will prevent any further decrease in steel demand, since those familiar with steel are aware that what demand there has been of late has not been to any extent for replacement of steel which had combined with oxygen.

It is more to the point to consider maximums, relative to the present business and financial situation. It is easy to err by acquiring a notion that steel demand cannot increase until there is a better fundamental situation. This country is still going, doing a great deal of business. It may not have been fully supplying its requirements of late, in keeping with the volume of business it has been doing. Continuation of present conditions might easily be accompanied by increased demand for steel. Memory is fresh of various outlets for steel having shrunk, demand drying up, but the thing has already occurred and may have been fully written into the steel production statistics.

From March, the high month of the year, to September, there was an average shrinkage in steel production, from one month to the next, of 10.4 per cent a month, September being 48.3 per cent under March. From September to October the decrease was less than 1 per cent, 0.92 per cent, to be exact. This month is running above October, contrary to usual seasonal precedent.

Stocks of steel in the hands of jobbers and manufacturing consumers have been cut and cut until there can scarcely be anything at all left. Stocks of their customers in turn have gone the same way. The policy has been pursued partly by reason of financial conditions, now believed to be strongly on the mend, and banking advice, and in many cases no doubt it has been pursued beyond the line of

efficiency and economy. There may easily be a reversion.

In the great ups and downs which steel demand exhibited before the war there was coined a phrase "demand grows while it sleeps" and the outcome always brought confirmation, the successive peaks of demand being higher and higher. We are not now applying the idea to demand in some future year when there is full activity, but to the immediate future, on the ground that of late this country, going merely at reduced speed, may be accumulating wants which it is capable of supplying in the next few months.

Old Fashioned Serving Trays

To the Editor:—Replying to the inquiry in your issue of Oct. 22 concerning serving trays, we do not know of any one making these goods in this country; in fact, they are largely imported from Russia, all decorated and sold at prices finished that American manufacturers could not touch.

Your correspondents might write M. Breslauer & Co., 225 Fifth Avenue, New York, who are large importers of the Russian goods, and they would undoubtedly learn something of interest.

I. S. SPENCER'S SONS, INC.

Guilford, Conn.

▲ ▲ ▲

Engineers Confer on Unemployment Relief

With a well-attended mass meeting at the Engineering Societies Building, New York, on the evening of Nov. 9, the relief work of the Professional Engineers Committee on Unemployment got further under way.

The general committee, organized Oct. 21, is made up of 40 members drawn from the American Society of Civil Engineers, the American Institute of Mining and Metallurgical Engineers, the American Society of Mechanical Engineers and the American Institute of Electrical Engineers, and is headed by H. deB. Parsons, consulting engineer, New York. It contemplates the unemployment relief for engineers in the metropolitan, New York, district, more than 2200 of the 10,000 engineers in the metropolitan area being said to be in need of financial or other assistance. Professional pride and solidarity, and cooperation in the conservation of engineering ability were keynotes of many addresses at the meeting. Use of unemployed engineers in research that needs to be undertaken was one measure urged to relieve the distress of unemployment.

In addition to the general committee, there are several main committees. These include the executive, headed by J. P. H. Perry, vice-president, Turner Construction Co.; a relief committee, the chairman of which is G. L. Lucas, and a finance committee, headed by H. A. Kidder. Subcommittees have been appointed to function under these main committees. Meetings are to be held once or twice each week. A registration bureau for unemployed engineers is maintained at 29 West Thirty-ninth Street, room 201.

Speakers included several members of the Gibson Emergency Unemployment Relief Committee, which is devoted to the relief of the 750,000 unemployed in New York and which, through its emergency work bureau that seeks to create temporary employment will cooperate with the engineers committee. The presidents of the four founder engineering societies made convincing appeals for the support of these engineers relief activities.

▲ ▲ ▲

Ford Changes Motors to Alternating Current

The Ford Motor Co. is changing over all of its electric motors at the Rouge plant from direct to alternating current. The work, involving 27,000 motors, is about 45 per cent completed, and already has cost $6,000,000. It is estimated that an additional year will be required to finish the installation.

In approaching the task, Ford engineers made a survey of the plant, taking into consideration the various sizes and duties of the old motors. From the survey was formulated a schedule covering the needs of individual buildings and affecting equipment ranging from small machines to long conveyors. The change-over in many cases will save from 1 to 2 hp. on each machine. Work already finished yields a saving of over 2000 hp. compared with the old set-up.

A similar change at the Detroit plant of the Lincoln Motor Co., a Ford subsidiary, is being made at an expenditure of $600,000.

▲ ▲ ▲

Aluminum Leaf on Metal Used for Hotel Domes

Aluminum leaf on the twin domes of the new Waldorf-Astoria Hotel in New York, suggests this coating as a desirable finish for metals in other decorative applications. The domes of the hotel were finished by painters of the Barker Painting Co., New York. The copper was first thoroughly washed down with a strong solution of soda, after which a coat of red lead was applied. On this a slow size was used, the workmen each afternoon covering the surface to which leaf was to be applied the next day.

Clear varnish on the finished dome was considered as a final protection against atmospheric action, but, as this would have affected the brightness of the leaf, it was decided to leave the aluminum exposed. On interior metal work, the same method of application was used as on these domes, except that a quick size was used before application. For exterior work the quick size does not give a sufficiently durable finish.

▲ ▲ ▲

Material Factor in Carbon Arc Welding

(*Concluded from page* 1244)

weld, and that these conditions are similar to those which occur in the refining of open-hearth steel. This premise would appear untenable for three reasons:

1.—Equilibrium conditions in liquid steel change rapidly with variations in temperature, and the liquid material in the weld is most certainly at an entirely different temperature from the finishing temperature of an open-hearth heat.

2.—The atmosphere surrounding the metal in the weld is entirely different from the atmosphere in the open-hearth furnace, and gas-metal reactions are therefore quite different.

3.—In the short time that the weld metal is molten it is improbable that equilibrium is established.

For these reasons we cannot agree with the "equilibrium curve" proposed by the author for the composition of welding steels. An open-hearth steel containing 0.010 to 0.015 per cent silicon may as likely as not have 75 to 80 per cent of this silicon present as SiO_2, and the same conditions hold for aluminum content. It is very doubtful if it will be humanly possible for the steel maker to make steel to as close a silicon and aluminum specification as indicated by the author's curves. Furthermore, if he did meet these specifications it would mean nothing, because there is no guaranty that all the silicon and the aluminum are present in the metallic state.

▲ ▲ ▲

Production of boilers, tanks and engines in Canada was valued at $9,597,239 in 1930, according to the Dominion Bureau of Statistics, Ottawa, Ont. This output value was slightly under the record established in 1929, but was 47 per cent over the total production in 1928 and 61 per cent greater than that for 1927.

Steel Operations Gain Slightly for the Third Week

▲ ▲ ▲

IMPROVEMENT More Noticeable in Inquiries Than in Orders—Industry Looks to First Quarter for Real Betterment

▼ ▼ ▼

FOR the third consecutive week, steel ingot production has gained slightly, being estimated at 31 per cent against 30 per cent last week and 29 per cent the week before that. Against an average output of 27.76 per cent in October, this is the most consistent increase in steel activity since last spring. While its importance could easily be exaggerated in view of the sluggishness of some branches of the industry, there is hope of further slight betterment during the remainder of the year, particularly in automobile tonnage, to be followed, perhaps, by a sharper upturn in the first quarter of 1932.

Steel-making rates have not changed materially except at Wheeling and in the Valleys, but orders for some lines of finished steel, sheets especially, are more numerous and inquiries have shown an even more noteworthy expansion, undoubtedly indicating greater requirements, as manufacturers would be slow to increase stocks with the inventory season approaching and with no price advances in immediate prospect.

Some improvement in business has come from farm implement manufacturers, warehouse distributers, the oil country and agricultural communities. The rise in prices of staple commodities has had a wholesome psychological effect, but industry is inclined to view the rapidity of the advance as somewhat speculative and has not lost its sense of caution.

ALTHOUGH automobile orders for steel are improving, much of the steel that will be needed for production of new models is still to be specified. The Ford Motor Co. has been particularly slow in releasing tonnage, which points to the possibility of a delay in its new manufacturing program.

Expectations for the remainder of the year have been modified somewhat by the probability that the bulk of rail orders, usually placed at this time, will go over until January. Ordinarily the mills have this tonnage in hand for rolling in the early winter months. Some car repair work is being done. The Norfolk & Western is to rebuild 500 steel coal cars, and the Western Fruit Express is inquiring for 300 steel underframes for cars. The Delaware, Lackawanna & Western will buy 12 freight locomotives.

THE steel mills are not receiving much fresh support from building construction, notwithstanding that a reliable estimate places the amount of pending work at 650,000 tons. A conspicuous feature of current activity in this field is the very small number of private undertakings, public projects predominating. Lettings in the week were only 17,000 tons, but new inquiries total 32,000 tons, including 20,000 tons for Federal buildings in Cleveland and Pittsburgh. A San Francisco pipe line has taken 7000 tons of plates.

Although the steel industry looks to the farm sections for some business gains, provided the improvement in grain prices is maintained, the situation is complicated by poor collections and the difficulty of obtaining bank credits. Wire mills in the Chicago district have stepped up operations, largely because of increased orders from rural districts. Inquiry for tanks for Texas and Oklahoma fields is directly attributed to the rise in crude oil prices.

Pig iron business continues to expand at Chicago, where 15,000 to 20,000 tons of inquiry is pending, but elsewhere there is no noteworthy change. Prices are weak in some districts. Steel scrap, however, has shown an indication of renewed strength at Pittsburgh. THE IRON AGE composite price for pig iron has declined to $14.96 from $15 last week, but steel scrap is slightly higher at $8.75 compared with $8.71 last week. Finished steel is unchanged at 2.116c. a lb.

STEEL ingots made in October, as reported by the American Iron and Steel Institute, totaled 1,592,376 tons, or 58,977 tons a day for 27 days. Based on the daily rate, this was a decline of about 1 per cent from September, but the month's total, owing to the extra working day, gained about 3 per cent. The 10 months' output was 22,004,112 tons, or a loss of 37.3 per cent from the 35,094,520 tons produced in the corresponding period of 1930.

Unfilled tonnage of the United States Steel Corpn., as of Oct. 31, declined 25,401 tons, whereas the average change in October in the decade from 1921 to 1930 was an increase of 59,000 tons. Unshipped orders of the leading producer at the end of last month were 3,119,432 tons.

A reduction in short-haul freight rates on steel in Central and Trunk Line territories went into effect Nov. 10.

▲▲▲ A Comparison of Prices ▲▲▲

Market Prices at Date, and One Week, One Month and One Year Previous, Advances Over Past Week in Heavy Type, Declines in Italics

Pig Iron,

Per Gross Ton:	Nov. 10, 1931	Nov. 2, 1931	Oct. 13, 1931	Nov. 11, 1930
No. 2 fdy., Philadelphia	*$15.51*	$15.76	$16.26	$18.76
No. 2, Valley furnace	16.00	16.00	17.00	17.00
No. 2 Southern, Cincinnati	14.69	14.69	14.69	15.19
No. 2, Birmingham	12.00	12.00	12.00	14.00
No. 2 foundry, Chicago*	17.00	17.00	17.00	17.50
Basic, del'd eastern Pa.	*16.25*	16.75	16.75	17.75
Basic, Valley furnace	15.00	15.00	15.50	17.00
Valley Bessemer, del'd P'gh	18.26	18.26	18.76	19.26
Malleable, Chicago*	17.00	17.00	17.00	17.50
Malleable, Valley	16.50	16.50	17.00	17.50
L. S. charcoal, Chicago	25.04	25.04	25.04	27.04
Ferromanganese, seab'd carlots	†85.00	†85.00	†85.00	94.00

*The average switching charge for delivery to foundries in the Chicago district is 61c. per ton.

†Ferromanganese quotations adjusted to carload unit; larger quantities at discount.

Rails, Billets, etc.,

Per Gross Ton:				
Rails, heavy, at mill	$43.00	$43.00	$43.00	$43.00
Light rails at mill	34.00	34.00	34.00	36.00
Rerolling billets, Pittsburgh	29.00	29.00	29.00	31.00
Sheet bars, Pittsburgh	29.00	29.00	29.00	31.00
Slabs, Pittsburgh	29.00	29.00	29.00	31.00
Forging billets, Pittsburgh	35.00	35.00	35.00	36.00
Wire rods, Pittsburgh	35.00	35.00	35.00	36.00
	Cents	Cents	Cents	Cents
Skelp, grvd. steel, P'gh, lb.	1.60	1.60	1.60	1.60

Finished Steel,

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Bars, Pittsburgh	1.60	1.60	1.60	1.60
Bars, Chicago	1.70	1.70	1.70	1.70
Bars, Cleveland	1.65	1.65	1.65	1.65
Bars, New York	1.93	1.93	1.93	1.93
Tank plates, Pittsburgh	1.60	1.60	1.60	1.60
Tank plates, Chicago	1.70	1.70	1.70	1.70
Tank plates, New York	1.88	1.88	1.88	1.88
Structural shapes, Pittsburgh	1.60	1.60	1.60	1.60
Structural shapes, Chicago	1.70	1.70	1.70	1.70
Structural shapes, New York	*1.85¼*	1.85½	1.85½	1.85½
Cold-finished bars, Pittsburgh	2.10	2.10	2.10	2.00
Hot-rolled strips, Pittsburgh	1.50	1.50	1.55	1.60
Cold-rolled strips, Pittsburgh	2.05	2.05	2.15	2.35

Finished Steel,

Per Lb. to Large Buyers:	Nov. 10, 1931	Nov. 2, 1931	Oct. 13, 1931	Nov. 11, 1930
	Cents	Cents	Cents	Cents
Hot-rolled annealed sheets, No. 24, Pittsburgh	2.40	2.40	2.40	2.35
Hot-rolled annealed sheets, No. 24, Chicago dist. mill	2.50	2.50	2.50	2.45
Sheets, galv., No. 24, P'gh	2.90	2.90	2.90	2.95
Sheets, galv., No. 24, Chicago dist. mill	3.00	3.00	3.00	3.10
Hot-rolled sheets, No. 10, P'gh	1.70	1.70	1.70	...
Hot-rolled sheets, No. 10, Chicago dist. mill	1.80	1.80	1.80	...
Wire nails, Pittsburgh	1.90	1.90	1.90	1.95
Wire nails, Chicago dist. mill	1.95	1.95	1.95	2.00
Plain wire, Pittsburgh	2.20	2.20	2.20	2.30
Plain wire, Chicago dist. mill	2.25	2.25	2.25	2.35
Barbed wire, galv., Pittsburgh	2.55	2.55	2.55	2.60
Barbed wire, galv., Chicago dist. mill	2.60	2.60	2.60	2.75
Tin plate, 100-lb. box, P'gh	$4.75	$4.75	$4.75	$5.00

Old Material,

Per Gross Ton:				
Heavy melting steel, P'gh	**$10.25**	$10.12½	$10.25	$13.25
Heavy melting steel, Phila	8.00	8.00	8.25	11.50
Heavy melting steel, Chicago	8.00	8.00	8.00	10.00
Carwheels, Chicago	9.00	9.00	9.50	12.50
Carwheels, Philadelphia	11.50	11.50	12.00	14.50
No. 1 cast, Pittsburgh	10.00	10.00	10.00	12.50
No. 1 cast, Philadelphia	10.50	10.50	11.50	12.00
No. 1 cast, Chicago (net ton)	8.50	8.50	8.50	9.50
No. 1 RR. wrot., Philadelphia	9.50	9.50	10.00	14.00
No. 1 RR. wrot., Ch'go (net)	6.50	6.50	7.00	8.50

Coke, Connellsville,

Per Net Ton at Oven:				
Furnace coke, prompt	$2.40	$2.40	$2.40	$2.50
Foundry coke, prompt	3.50	3.50	3.50	3.50

Metals,

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Lake copper, New York	7.37½	7.37½	7.37½	9.62½
Electrolytic copper, refinery	6.75	6.75	6.75	9.25
Tin (Straits), New York	**23.65**	22.25	23.12½	25.12½
Zinc, East St. Louis	**3.25**	3.15	3.45	4.37½
Zinc, New York	**3.60**	3.50	3.80	4.72½
Lead, St. Louis	**3.90**	3.80	3.82½	4.95
Lead, New York	**4.05**	4.00	4.00	5.10
Antimony (Asiatic), N. Y.	**6.85**	6.50	6.50	7.10

On export business there are frequent variations from the above prices. Also, in domestic business, there is at times a range of prices on various products, as shown in our market reports on other pages.

▼ ▼ ▼

▲▲▲ The Iron Age Composite Prices ▲▲▲

	Finished Steel	Pig Iron	Steel Scrap
Nov. 10, 1931	2.116c. a Lb.	$14.96 a Gross Ton	$8.75 a Gross Ton
One week ago	2.116c.	15.00	8.71
One month ago	2.116c.	15.34	8.83
One year ago	2.135c.	16.29	11.58
	Based on steel bars, beams, tank plates, wire, rails, black pipe and sheets. These products make 87 per cent of the United States output.	Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Birmingham.	Based on No. 1 heavy melting steel quotations at Pittsburgh, Philadelphia and Chicago.

	Finished Steel		Pig Iron		Steel Scrap	
	High	Low	High	Low	High	Low
1931	2.142c., Jan. 13	2.102c., June 2	$15.90, Jan. 6	$14.96, Nov. 10	$11.33, Jan. 6	$8.71, Oct. 27
1930	2.362c., Jan. 7	2.121c., Dec. 9	18.21, Jan. 7	15.90, Dec. 16	15.00, Feb. 18	11.25, Dec. 9
1929	2.412c., April 2	2.362c., Oct. 29	18.71, May 14	18.21, Dec. 17	17.58, Jan. 29	14.08, Dec. 3
1928	2.391c., Dec. 11	2.314c., Jan. 3	18.59, Nov. 27	17.04, July 24	16.50, Dec. 31	13.08, July 2
1927	2.453c., Jan. 4	2.293c., Oct. 25	19.71, Jan. 4	17.54, Nov. 1	15.25, Jan. 11	13.08, Nov. 22
1926	2.453c., Jan. 5	2.403c., May 18	21.54, Jan. 5	19.46, July 13	17.25, Jan. 5	14.00, June 1
1925	2.560c., Jan 6	2.396c., Aug. 18	22.50, Jan. 13	18.96, July 7	20.83, Jan. 13	15.08, May 5

Valley and Wheeling Mill Operations Gain; Pittsburgh Steel Inquiry Is Improved

PITTSBURGH, Nov. 10.—While no further gains in steel ingot production have been shown in the immediate Pittsburgh district this week, both the Wheeling and Valley territories have shown increases. At the same time, releases on finished steel have increased a little and inquiry is generally heavier.

Improvement in specifications from the automobile industry has been very limited, but more impressive gains have been made in the requirements of oil country consumers, farm implement manufacturers and jobbers serving the agricultural districts in the South and West. Railroad demand is still rather quiet, although inquiry for freight cars and locomotives has shown a little betterment and there is some movement of steel for car repair purposes.

The ingot production rate in the Pittsburgh district is estimated at 30 per cent for the second consecutive week, a gain of five points from the October level. A steel works blast furnace has been blown out, but this has not altered steel production materially. A sharp gain is reported in the Wheeling district, where production of ingots is estimated at 50 per cent of capacity. Moderate increases are also reported from the Valley.

Finishing mills generally are running at about the rate which has prevailed recently, and their requirements are sufficient to justify present open-hearth and Bessemer steel production.

Sellers of steel are giving considerable attention to prices, but have noticed no signs of unusual weakness. Talk of advances for first quarter is heard only in connection with wire and nails, which have been unusually well held since the beginning of the quarter. On heavy hot-rolled products no change is contemplated unless unusually heavy buying develops in the closing weeks of the year. This is not considered likely. Sheet prices are holding fairly well, and irregularities in strip steel have been eliminated to some extent since quotations were revised downward recently.

The raw materials market is featured by a strengthening in scrap prices, following purchases by at least two consumers. Pig iron is still very quiet.

Pig Iron

A few consumers of pig iron have shown more interest in their future requirements in the last week, but

▲ ▲ ▲

Pittsburgh ingot operating rate remains at 30 per cent, but gains are made in Valleys and at Wheeling.

* * *

Steel releases show some gain, mostly from oil country consumers, farm implement manufacturers and warehouse distributers.

* * *

No signs of unusual weakness in steel prices. Except for nails and wire, no advances for first quarter are contempiated.

* * *

Heavy steel scrap moves slightly higher on sales to consumers.

▼ ▼ ▼

actual buying has shown no improvement. Shipments are running at about the rate which prevailed during October. The price situation is somewhat confused, particularly in the Valleys, where competition of Lake Erie furnaces is encountered. In the immediate Pittsburgh territory the local furnace quotations are holding on such purchases as are reported.

Semi-Finished Steel

With production of non-integrated sheet, strip and tin plate mills generally unchanged, movement of semi-finished steel this month has not gained materially over that of October. However, inquiry has improved, and some buyers who have been placing orders from hand to mouth for several months are showing interest in forward purchases. The price of billets, slabs and sheet bars is unchanged at $29, Pittsburgh, while forging billets are well held at $35. Wire rods continue rather dull, but the price is holding at $35, Pittsburgh or Cleveland.

Rails and Track Supplies

Significant railroad purchases are still being held in abeyance, and steel companies feel that some further adjustment, possibly in wages, will have to be made before any real demand from the carriers can be developed. At the same time, orders for rails and track accessories for 1932 cannot be postponed entirely, and purchases are expected to be made by virtually all the roads, even though the tonnage taken may fall somewhat under that for 1931. Rail production in the district continues at about 30 per cent of capacity, with schedules next week still a matter of conjecture.

Bolts, Nuts and Rivets

No appreciable gains in releases have occurred thus far in the month, and production continues at recent minimum schedules at 20 to 25 per cent of capacity. Quotations on bolts and nuts are still weak, but large rivets are better maintained at $2.25 a 100 lb. Small rivets continue at 70, 10 and 5 per cent off list.

Bars, Plates and Shapes

Plans for the superstructure of the Pittsburgh Post Office have finally been released, and it is estimated that 12,000 to 15,000 tons of structural steel will be required. Bids on the general contract will be taken on Dec. 15. This is the largest structural inquiry to appear in this district for some time, but rolling of the steel needed will not get under way before spring. Otherwise, the structural market is rather quiet and only the larger fabricators have backlogs of size.

Reinforcing bars are also rather quiet, although a local fabricator has booked 900 tons for approaches to the West End-North Side bridge in Pittsburgh. Among the more active inquiries for plates is that of the Mississippi Valley Barge Line, St. Louis, on which bids go in Nov. 11. From 10 to 40 barges will be ordered, requiring from 1100 to 4400 tons of plates. Merchant bars are also rather dull, although inquiry from miscellaneous manufacturing consumers is somewhat heavier. Specifications from automobile and parts makers are improving, but very slowly. The same is true of alloy steel bars, although makers are hopeful of more rapid gains before the end of the month.

Prices on the general run of orders are well held at 1.60c., Pittsburgh, and no advance is contemplated unless the larger users decide to cover for more substantial needs.

Cold Finished Steel Bars

Specifications are heavier than they were in the corresponding October period, but still fail to show any marked gain. Inquiry is better. The

CURRENT MARKET PRICES FOR STEEL, PIG IRON AND OLD MATERIAL WILL BE FOUND ON PAGES 1272 TO 1276, INCLUSIVE

price is well established at 2.10c., Pittsburgh.

Tubular Goods

Demand for pipe from the oil fields has picked up materially in the last week or two. Makers are by no means certain that the increase will be continued, but even heavier drilling operations are promised if the price of oil continues to strengthen. No new inquiry for line pipe is reported, and orders are principally for small tonnages required for feeder lines. Butt-weld pipe is quiet, and mill operations average one to two days a week. The pipe industry as a whole is not engaged at more than 25 per cent of capacity.

Wire Products

Better feeling in the agricultural sections is reflected in demand for merchant wire products. Lightness of jobbers' stocks in this territory is illustrated by the fact that a large percentage of current releases are coming by telegraph. Manufacturers' wire has shown only moderate improvement, but demand is better this month than it was last. The price of nails is well maintained at $1.90 a keg, while manufacturers' wire continues at 2.20c., Pittsburgh. Improved sentiment, coupled with somewhat better demand, has prompted talk of price advances for the first quarter.

Sheets

Specifications from the automobile industry reveal limited gains, and increases from farm implement makers in the last week or two have shown a much more significant expansion. There is also an increase in movement of sheets for roofing, which had been postponed later than usual this year because of unusually mild fall weather. Demand from manufacturing consumers in general shows little change, and production of sheet producers in general still averages 25 to 30 per cent. The corresponding figure on full finished material is a little higher. Sheet prices are generally fairly well maintained, although little adequate test is available. A Pittsburgh district company has begun the production of wrought iron sheets, establishing a base carload price of 3.70c. a lb. for black sheets and 4.45c. on galvanized.

Tin Plate

Production for the industry as a whole is unchanged and varies rather sharply from week to week except on the part of companies which are working on anticipated tonnage. Contracting for the first half of 1932 is still being delayed by a number of buyers.

Strip Steel

Releases on strip steel are gaining, but are still falling somewhat under previous expectations for November. The automobile industry as a whole is still holding back its specifications, although one or two companies have done some heavy ordering. Other lines of consumption do not show much change. Prices are holding fairly well, with hot-rolled strip quoted at 1.50c. to 1.55c. for 6 in. and wider, and 1.60c. to 1.65c. on narrower widths. Cold-rolled strip is maintained at 2.05c. to 2.15c.

Old Material

With buying by at least two consumers reported in the last week, the scrap market has gained considerable strength, and offerings continue to diminish. While one mill was able to buy heavy melting steel at $10.25, another paid $10.50, and the Pennsylvania Railroad list is reported to have brought even more. Hydraulic compressed sheets have been sold at both $10 and $10.25, and one dealer is offering as high as $10 to cover recent commitments. Dealers are generally unwilling to contract for substantial tonnages at the present price level, as many of them feel that a rise is imminent. The other grades of scrap show little change in price, although some sales have been made. Specialties have gained strength in some quarters, but consumer offering prices are still low. Blast furnace scrap is very quiet.

Coke and Coal

Except for some seasonal increases in domestic coke, the market is generally unchanged. No activity in furnace coke is in evidence, and the price is unchanged at $2.40, Connellsville. Foundry coke consumption continues to show a faint upward trend. The coal market is also quiet, although domestic grades are a bit more active.

▲▲▲

Valley Mills Operating at Slightly Higher Rate; No Sustained Betterment Expected Until 1932

YOUNGSTOWN, Nov. 10.—While the Valley steel industry shows improving tendencies, the extent of the gain is being over-emphasized in some quarters. For the second week in November, Valley mills are operating at a 35 per cent average, with 24 of 66 open-hearths active, against 20 last week and 14 at the year's low point, several weeks ago. The principal encouraging factor is the larger number of inquiries received. There are expectations of larger buying by the automobile industry. However, Valley steel producers look for no sustained betterment until after the first of the year, but they do expect the first quarter of 1932 to register substantial gains.

Republic Steel Corpn. is operating eight of 13 open-hearth furnaces, against five last week. At its Campbell works, the Youngstown Sheet & Tube Co. is averaging 35 per cent, having increased steel-making and sheet production. The Sheet & Tube rod mill at Struthers was placed in operation Monday, following a week's idleness, the first time in several months the unit had been idle.

An encouraging factor in the current situation is that buying sources which have long been dormant are again coming into the market, either with inquiries or orders. A wire rod order was received the past week, for example, for shipment to the export division of the Chevrolet Motor Co. at Bloomfield, N. J., the first of this kind in many months.

Of 31 blast furnaces in the Youngstown district, eight are in blast, with one banked. Carnegie Steel Co. and Republic Steel are each operating three stacks at Youngstown; the Sharon Steel Hoop Co. has one furnace on at Lowellville, while the Youngstown Sheet & Tube Co. is operating one stack at Campbell, and has a furnace banked at its Hubbard property.

▲▲▲

Cincinnati Trade Is More Hopeful

CINCINNATI, Nov. 10.—Improvement in industrial conditions in other markets is reflected here in a more optimistic attitude among the trade. Small inquiry for pig iron has increased slightly, while shipments against old contracts have been a shade better than last month. The last week's total business of about 1500 tons was made up of orders of less than 100 tons. Operations of machine tool foundries are almost negligible, while other foundries are receiving an irregular demand. Northern pig iron prices continue to be uncertain, contrasting with the firmness of Southern quotations. Coke shipments are a trifle better than last month.

Finished Steel

A small increase in automotive specifications has brought demand to near the 40 per cent level. Scattered inquiry for future requirements has strengthened sentiment that a slow uptrend has begun.

Old Material

The scrap market is quiet and featureless. Mill buying is small and shipments are slow. Dealers' bids are nominal. The Chesapeake & Ohio, Norfolk & Western and the Southern are offering their usual lists.

Chicago Steel Demand Gains a Little; Operations Are a Shade Higher

▲ ▲ ▲

CHICAGO, Nov. 10.—Although there has been a slight improvement in the general demand for finished steel, it is evident that the major consuming industries in and around Chicago have not experienced any marked upturn in production. Fabricators are still eagerly seeking new work, and the outlook is none too promising except that small inquiries are more numerous. Tank builders are urgently in need of work and pipe mills find encouragement only in a slightly larger demand from jobbers.

Farm equipment manufacturers are cautiously stepping up output as a measure to round stocks in warehouses and to give some employment. They appear to view the strength of the grain markets as a favorable sign, but contend that full benefits will not come to the industry until full measure can be taken of the speculative features of grain price movements. In other words, they feel that wheat will have to hold at 70c. or above. Wire producers are especially optimistic over the farm produce markets. There is already a quickening in demand for wire products from rural districts and the disposition is to build mill stocks in anticipation of an active spring trade.

The railroad equipment market is limited to reports that are difficult to verify. In the meantime, car shops can operate only a few days at a time after miscellaneous repair and replacement orders have accumulated in sufficient volume to justify putting on a small temporary force. The rail market may prove to be dull throughout the remainder of this year. It is the opinion of some that most commitments for 1932 delivery will be made after Jan. 1. Ingot output is a shade above 25 per cent of capacity. Only eight of 36 steel mill blast furnaces are producing metal at a uniform rate. The Joliet stack is being banked alternate weeks.

Although steel demands have gained slightly in some lines, operations are only a trifle higher this week.

* * *

Rise in grain prices has good psychological effect, but fears of excessive speculation create caution in industry.

* * *

Some increase in business has come from agricultural communities. Farm implement manufacturers increase operations moderately.

* * *

Pig iron demand active, with inquiries pending for 15,000 to 20,000 tons.

▼ ▼ ▼

Pig Iron

Shipments of Northern foundry iron continue to grow, though progress is slow and the aggregate is still far below what is usually expected at this time of year. Shipping instructions point to further growth, and new buying gives added promise for the future course of the market. New inquiries before the trade total between 15,000 and 20,000 tons. Much of this is for first quarter delivery for the reason that inventory time is close at hand and users are disinclined to put pig iron on the ground at this time of year. Some interest is being displayed in first half needs. Navigation will be held open to Dec. 5 this year, at least 20 days longer than usual. This is giving rise to speculation as to the possibility of silvery and Lake Erie pig iron moving here by boat for dock storage and delivery after navigation is closed. Charcoal iron producers have already taken this step and have sizable tonnages on docks at Milwaukee and Chicago. Prices for charcoal iron are again showing some variation, and the market lacks strength. Southern iron is steady at $11 a ton, Birmingham, but the movement in this direction is very light.

Coke

Prices for by-product foundry coke are steady at $7.50 a ton, local ovens, as the contracting period draws near. Shipments continue to gain slowly and give promise of further expansion in the current month.

Reinforcing Bars

This market remains stagnant except for a few releases of bars for Illinois road work. Recent reports of new road contracts are in fact confirmations of old orders placed before final disposition of the wage law. Prices are stronger as mills are less willing to back dealers' low bids. Rail steel for bridges is now going at the slab price of 1.40c. a lb. The quotation of 1.50c. on culverts is holding. Rail steel bars for buildings range from 1.30c. to 1.40c.

CURRENT MARKET PRICES FOR STEEL, PIG IRON AND OLD MATERIAL WILL BE FOUND ON PAGES 1272 TO 1276, INCLUSIVE

Steel Pipe

Demand from jobbers is again showing life after several months of extreme dullness. The large diameter pipe market is quiet except for the release of an old order for 4000 tons to a Youngstown mill.

Wire Products

Demand is a trifle better, especially from rural districts, where advances in grain prices are having immediate effect. Producers are once again expanding output, partly as a result of heavier shipments and also to round out stocks that have been comparatively small for the past few months. Output averages 30 per cent of capacity, a gain of five points since the first of the month. Although orders from public utilities are slow, it is quite apparent that closer study is being made of future requirements of electrical wires and cables.

Cast Iron Pipe

Small inquiries are more numerous and there is more proposed work in sight. About 200 tons will be used for a heating main at Springfield, Ill. Dearborn, Mich., will open bids Nov. 11 on 14,000 ft. of 8-in. pipe and will receive tenders on the 17th on 14,000 ft. of 8-in. and 3700 ft. of 12-in. Prices continue to ease, and 6-in. and larger pipe is available at $32 to $36 a ton, Birmingham.

Prices per net ton, deliv'd Chicago: Water pipe, 6-in. and over, $40 to $44; 4-in., $43 to $47; Class A and gas pipe, $3 extra.

Warehouse Business

The first week in November showed rather a remarkable upturn in number of orders as compared with the average in the two last weeks in October. The second week of the month is starting not quite so actively, but improvement over October is still in evidence.

Sheets

Output remains at 25 per cent of capacity, and there is no immediate

change in sight. The Milwaukee hot mills may resume operations for a short period as an aid in the unemployment situation. No increase in distribution by jobbers is observed yet by mills.

Bolts, Nuts and Rivets

There is little encouragement in this market in the Chicago area beyond the fact that several farm implement manufacturers are showing greater interest. Shipments so far in November show little change from the October rate except where producers are serving the expanding needs of automobile plants.

Hot-Rolled Strip

Concessions of $1 a ton have been made here and there, but on the whole the market remains at 1.65c. and 1.75c. a lb. Shipments are slightly larger, but new buying is dull. Producers are inclined to the view that a sharp upturn in demand from automobile manufacturers will come in 10 days to three weeks.

Rails and Track Supplies

There are reports that most of the purchases of rails and track supplies by Western railroads will be deferred until after the first of the year.

Structural Material

Inquiries are enlivened by Illinois highway bridge projects and wider interest in small private undertakings. However, the market as a whole is drab, with none of its characteristic late fall activity and with little prospect of marked improvement until spring. Fabrication of structural steel for the Chicago Post Office will soon be under way.

Plates

Outstanding in this week's business is an order for 2000 tons of plates for tanks that are to be erected in the Southwest. Evanston, Ill., is planning to build a large water storage tank. Local car shops are operating intermittently on small repair orders.

Bars

A slight increase in bar demand comes almost wholly from automobile parts makers and farm implement manufacturers. Mill operations, in addition to bejng somewhat heavier, are also more stable. Rail steel bar producers are hopeful that advances in farm products markets will aid in reviving the barn equipment industry.

Old Material

Heavy melting steel has again been sold at $8.25 a gross ton, delivered, thereby giving support to the entire scrap list. Orders aggregated about 10,000 tons. A cargo of scrap is said to have moved by boat out of Green Bay, Wis., and it is not unlikely that another cargo of cast iron borings will move from Chicago before the close of navigation. Eastern brokers are said to contemplate accumulating borings on Chicago docks for movement by boat next spring. New interstate switching rates, which were to have gone into effect Tuesday, have been suspended one month, according to word from Washington. Had the advances gone into effect, brokers would have had to absorb the difference on orders in hand. It was thought by some that increased switching charges could have been passed to the consumer, though the sluggishness of the market might readily have worked against this.

▲▲▲

Pacific Coast Awards of Plates and Shapes Over 10,000 Tons; 7000 Tons for Pipe Line

SAN FRANCISCO, Nov. 9.—With the placing of several deferred projects, together with the award of 7000 tons of plates for an emergency water pipe line, the Far West has recorded well over 10,000 tons of finished steel contracts during the week. New inquiries are not large, however.

The warehouse trade reports that October was the best month of the current year. It is stated that volume has increased from 5 to 10 per cent on out-of-stock orders. At San Francisco the principal wholesalers are now operating strictly according to schedule, having abandoned preferred differentials that have crept in during recent months, and it is understood that Seattle distributers are to adhere to a schedule that is already lower than at other points on the coast, but which has been informally broken for many months.

Finished Steel

San Francisco has awarded its 24-mile emergency line of 44 and 36-in. pipe, requiring approximately 7000 tons of plates, to the Youdall Construction Co., and the Western Pipe & Steel Co. will do the fabricating. Work will be rushed. Another San Francisco municipal contract is for the Red Mountain Bar or Bear Creek siphon, for which 750 tons of plates will be required. The general contract has been awarded to McDonald & Kahn, but the steel has not yet been placed.

J. F. Duthie and John Pomeroy of the Wallace Bridge & Structural Steel Co., Seattle, have been in San Francisco arranging for the erection of the 8000-ton dirigible dock for the Navy at the Sunnyvale base. It is stated that the major fabrication will be done at Seattle, and that sub-contracts will be let to the Moore shipyard and the Pacific Coast Engineering Co. at Oakland.

Bar awards of 1200 tons are reported, practically all for highway and building projects. New inquiries total 1100 tons. Fabricated structural steel placed totaled 2450 tons, with future requirements announced that will require 700 tons.

Cast Iron Pipe

Awards of approximately 400 tons are reported, divided among a number of minor projects. The market continues irregular and weak, with great diversity of bids on public lettings, even when minor tonnage is involved. Tooele, Utah, is voting on bonds for $50,000 for mains and a 1,000,000-gal. water tank.

Pig Iron

Current quotations on No. 3 Utah iron are at $21.50, delivered, for San Francisco and Los Angeles, and $22 for Portland and Seattle. Price at furnace, Provo, Utah, is $17.

▲▲▲

New England Pig Iron and Scrap Markets Dull

BOSTON, Nov. 10.—Pig iron sales continue light, having been 1150 tons for the week, as compared with a like amount the previous week. The largest sale was 300 tons of No. 2X. The New England foundry melt is slightly larger, but still not more than 25 per cent of rated capacity. The Union Stove Works, Peekskill, N. Y., will melt no more iron and outstanding pig iron contracts have been canceled.

Reinforcing Steel

The only round lot let the past week was 280 tons for local subway work. Aside from some State road work, there is little business in the making. Prices are holding despite the lack of business.

Cast Iron Pipe

Meriden, Conn., has awarded 1000 tons of 6 in. Class C pipe to the Warren Pipe Co. of New England, Inc. Lawrence, Mass., closed bids Nov. 6 on 190 tons of 30 in. Class B pipe, but has made no award. Quite a tonnage of pipe was sold the past week in small lots.

Fabricated Steel

Reported lettings aggregate 5000 tons, the largest in many weeks. Fabricators have more to figure, and indications are that some fair tonnages will develop during the remainder of 1931.

Old Material

Current activity is confined to scattered small lots of miscellaneous material, with the bulk of sales to New England consumers.

Cleveland Sees Definite Turn for the Better in Steel

Tonnage from Automobile Industry, Largely in Sheets, Aids Northern Ohio Producers

CLEVELAND, Nov. 10.—A definite turn for the better is apparent in the finished steel market. There was an increase the past week in tonnage from the motor car industry in the Detroit territory, largely in sheets, which has enabled some of the Ohio mills to operate better this week. Local steel plant operations are unchanged at 32 per cent of ingot capacity, 11 of 34 open-hearth furnaces running. Local sheet and strip mills are operating.

Attention in the automotive field is now centered on the Ford Motor Co., which, while buying a little steel, has not yet come into the market for a large tonnage of sheets that will be required to get operations on a production basis. Reports are persistent that the Ford company has been delayed 30 days in getting under way and may not start making its new models until around the first of the year.

Chevrolet appears to be going ahead with its scheduled production program. This company is reported to have a schedule of 52,000 cars for January, following the previous announcement of the 79,000 scheduled for November and December. Several of the motor car manufacturers in the medium and higher priced class are now stepping up production on new models.

Stamping plants in this territory have a great deal of inquiry for automotive parts, but this business is slow in being placed. Automobile rim manufacturers are getting busier and some good business in truck rim sections was placed locally during the week.

New inquiry in the structural field is light and confined to public work. Preliminary plans have been prepared for the Cleveland Post Office, for which the estimated amount of steel to be required is 10,000 tons.

Prices generally are firm.

Pig Iron

Shipping orders from some of the motor car foundries have increased this month. However, new business continues light. Sales are mostly for small lots and result from solicitation rather than from definite inquiries. The market lacks firmness. Some of the Lake furnaces have large stocks and are making sufficient concessions to move iron to points where they have a disadvantage in freight rates. While there has been no recent price test on round lots in the northern Ohio territory, the regular $16 Lake furnace price on foundry and malleable iron is being shaded 50c. a ton in some cases. For Cleveland delivery, $17, furnace, is generally quoted.

Iron Ore

Ore on docks at Lake Erie ports Nov. 1 amounted to 6,079,512 tons, against 6,341,608 tons on the same date a year ago. These docks received 2,028,662 tons in October and 14,299,149 tons for the season, against 30,251,436 tons up to Nov. 1 last year. October shipments were 1,273,035 tons and for the season to Nov. 1, 10,699,626 tons, against 22,044,968 tons during the corresponding period last year. Receipts at other than Lake Erie ports in October were 1,161,679 tons and for the season to Nov. 1, 8,184,755 tons, against 13,345,485 tons during the same period last year.

Bolts, Nuts and Rivets

A large order for bolts and nuts has been placed by the Chevrolet Motor Co., which has released shipping orders, and some new business has come from other motor car manufacturers, including the Ford Motor Co., which buys only nuts. With this new business, some of the manufacturers increased plant operations slightly this week. Price irregularities continue. Demand for rivets is still slow.

Bars, Plates and Shapes

Demand for bars gained somewhat during the week both in number and size of orders. While the business came largely from the motor car industry, there was a gain in tonnage from manufacturers in other fields and from jobbers. A manufacturer of road building machinery has taken a large order from a Southern State for scrapers requiring 1500 tons of bars, which were placed during the week. Alloy steel bars are also slightly more active. Demand for plates has improved a little, but orders are for small lots. A Michigan shipyard has taken a coast guard cutter requiring 400 tons of steel. Cleveland has placed general contracts for its sewage disposal plant and exhibition hall requiring 11,000 tons of steel, which will be placed shortly. The former will take 1400 tons of sheet steel piling. Prices are steady at 1.65c., Cleveland, for steel bars and 1.60c., Pittsburgh, for plates and shapes.

CURRENT MARKET PRICES FOR STEEL, PIG IRON AND OLD MATERIAL WILL BE FOUND ON PAGES 1272 TO 1276, INCLUSIVE

Wire Products

Manufacturers' wire is showing more life and is firm at 2.20c., Cleveland. Nails are quiet.

Sheets

Orders and inquiries have gained somewhat from makers of automotive parts, refrigerators and metal furniture. Fair releases are now coming from the local Fisher Body plant, which is getting under production on Chevrolet bodies and new orders are expected from this source shortly. Regular prices apparently are being maintained.

Strip Steel

Hot-rolled strip is in slightly better demand than recently, due to new orders from the motor car and accessories manufacturers. While 1.50c., Pittsburgh, for wide strip and 1.60c. for narrow are being named to larger users, the prevailing prices for the smaller consumers are $1 a ton higher. Cold-rolled strip continues dull. While the 2.15c., Cleveland, price is being generally maintained on small-lot business, $1 to $2 a ton lower is being named to large buyers.

Old Material

Two Youngstown mills this week released shipments of steel-making and blast furnace scrap, and this action, together with shipments of heavy melting steel purchased by a Cleveland mill last week, has given the market a little more life than recently. Prices show a mixed trend. No. 1 heavy melting steel is slightly firmer and No. 2 steel and blast furnace scrap are lower, as the only market for these grades at present is in the Valley district. For delivery in that district, dealers are paying $4.50 for mixed borings and turnings.

▲ ▲ ▲

Scrap Buying at Detroit Improves Moderately

DETROIT, Nov. 9.—There has been a revival of scattered buying of steel grades in the local scrap market, with indications that mills may make sizable purchases in the near future. With considerable stocks of old material on hand, however, there is a possibility that steel companies may postpone taking much scrap until after the turn of the year so as to keep year end inventories as low as possible. For the first time in six months, steel scrap is moving from Detroit into the Canton, Ohio, district. There is also a movement of moderate proportions from upstate points to Youngstown. Prices are showing strength, with hydraulic bundles in especially good demand.

New York Steel Business Shows Moderate Increase

Pig Iron Sales Also Slightly Better—6000 Tons of Sheet Steel Piling Required for Piers

NEW YORK, Nov. 10.—Although total volume of new inquiry for pig iron in the past week reflects no change from the previous week, wider consumer interest is evidenced by a larger number of small-lot inquiries. The largest lot pending is 500 tons for early delivery to a New Jersey melter. Sales for the week totaled 5000 tons, compared with 4000 tons the week before and 3500 tons two weeks ago.

Foundry operations are unchanged. Sentiment among district melters, however, is considerably improved, in view of better prospects for castings orders. Shipments against standing orders continue at a fair rate, although in only few cases are consumers laying in stocks.

Competition for all business continues to be keen, with eastern Pennsylvania furnaces sharing in a major portion of new contracts.

Cast Iron Pipe

The only fresh inquiries which appeared in the past week are for 800 tons of 20 and 24-in. pipe for Syracuse, N. Y., and 100 tons of 6 and 8-in. for Niagara Falls, N. Y. The Bronx Water Works, general contractor for the Borough of Manhattan water project, purchased 1700 tons of 30-in. for this job from Warren Foundry & Pipe Corpn. That maker also took 1000 tons of 6-in. for Meriden, Conn.; 430 tons of 6, 8 and 10-in. centrifugal pipe for Glenville, N. Y., and 400 tons of 12-in. for Borough of Bronx. Ridgway, Pa., awarded contract for 600 tons of 12 and 20-in. to United States Pipe & Foundry Co., and Carlisle Springs, Pa., purchased 500 tons of 12-in. from the same maker.

Prices per net ton delivered New York: Water pipe, 6-in. and larger, $32.90; 4-in. and 5-in., $35.90; 3-in., $42.90. Class A and gas pipe, $3 extra.

Finished Steel

Steel buying has gained moderately in the past week, the improvement being most noticeable in sheets. A favorable indication is that inquiries have increased, which is taken as a reflection of expanding requirements, as consumers and jobbers would have no object in enlarging their stocks at this time, with the annual inventory period approaching and there being no likelihood of price advances in the near future.

Gains in one direction are offset somewhat by slow business in other products. Structural shapes and plates are conspicuously dull. Awards of fabricated structural steel in this district have been very light. Department of Water Supply, Gas and Electricity, New York, will take bids soon on 3000 tons (20,000 ft.) of 60-in. steel pipe to be fabricated from ½-in. plate for a water line to be laid in Queens. Allen N. Spooner & Son, Inc., New York, will soon place about 6000 tons of sheet steel piling for piers at West Forty-eighth Street, New York.

Reduced short-haul freight rates on steel went into effect today. The rate from Bethlehem, Pa., to New York is now 15¼c. per 100 lb., instead of 15½c. Rates from other eastern Pennsylvania mills are not affected as they are outside the 100-mile zone.

Old Material

The dealer shipping No. 1 and No. 2 heavy melting steel by barge to a Buffalo consumer is still buying for this delivery and will store the material on barges in New York harbor for movement when navigation is reopened on the canal. The buying prices have been reduced to $5.50 a ton for No. 1 and $4.50 for No. 2 steel, on barge, New York. The broker shipping No. 1 steel to a Bridgeport, Conn., consumer has covered all material for this contract. The only other movement of scrap at present is a small tonnage of No. 1 heavy melting steel being bought at $4.50, New York, for a Coatesville, Pa., mill, and at $5.10, New York, for a Florence, N. J., user.

▲ ▲ ▲

Birmingham Mills and Furnaces Have Not Yet Experienced Any Improvement in Business

BIRMINGHAM, Nov. 10.—Pig iron buying is still scattered and generally in small lots. November shipments are near the rate of October. Quotations are firm on a $12 base for district business. Furnace operations are the same as for some weeks, six being in blast.

Finished Steel

Although a rail order of 22,000 tons has been placed with the Tennessee Coal, Iron & Railroad Co. by the Louisville & Nashville Railroad, no plans have been announced for the reopening of the Ensley rail mill, which has been idle for several months. Operation may not be resumed until January. New tonnage in other lines during the past week or 10 days has been at about the average of the previous month. Fabricators have had only a small amount of new tonnage. Operations were somewhat changed last week. The Tennessee company alternated with four and five open-hearths at Fairfield, instead of six. The Gulf States Steel Co. closed down its Alabama City Works completely. Operations were resumed this week on the same schedule as previously.

Cast Iron Pipe

Kansas City, Mo., has divided 5600 tons among three Birmingham plants, American Cast Iron Pipe, National Cast Iron Pipe and United States Pipe & Foundry. Other new tonnage has been largely in car lots. Operations range from 30 to 35 per cent. Base prices on pipe are now $33 to $34.

Old Material

Shipments on contracts have improved somewhat, but new tonnage is small. Buying interest is not active.

▲ ▲ ▲

Buffalo Pig Iron Shipments Slightly Better; Steel Plant Operations Virtually Unchanged

BUFFALO, Nov. 10.—October was a better shipping month for pig iron than September, and producers are encouraged. Foundry melt has improved slightly. No sizable inquiries are before the market, but there is a steady run of carload and 100-ton orders.

Old Material

The leading consumer is holding up shipments until about Nov. 15. This, it is said, is due to heavy receipts of scrap over the barge canal. Other concerns are temporarily suspending incoming shipments. Stove plate and No. 1 machinery cast scrap are very scarce. There is considerable activity among dealers to get in stove plate against a recent $8.50 order. There is a demand for short turnings, and a few tonnages have been sold to frontier points at as high as $8 because it was necessary to take them from points outside of the customary source of supply.

Finished Steel

Operations are unchanged. The Lackawanna plant of Bethlehem Steel is operating eight open-hearths; the Republic Steel plant is idle this week; Wickwire Spencer has two open-hearths running. Other operations are the same. The new Michigan Avenue bridge will require 250 tons of reinforcing bars.

Eastern Pennsylvania Pig Iron and Steel Orders Gain Slightly

Betterment in Steel Inquiries More Noticeable Than in Tonnage Placed—Pig Iron Prices Weaker

PHILADELPHIA, Nov. 10.—Automobile body builders are increasingly active, placing orders for die steel and negotiating for sheets to execute contracts on which releases have recently been received. A substantial tonnage of forging ingots will be closed shortly by a Camden company for shafting in two new Navy cruisers. Steel bar buying is at a slightly higher level, but demand for plates is as small as at any time this year. General sentiment continues good as a result of improved conditions in various consuming lines. Except for pig iron, prices are being maintained with only minor concessions granted on the more desirable plate and shape orders. Mill operations in eastern Pennsylvania are unchanged at an average of 25 per cent of capacity.

Among current projects expected to bring some tonnage to mills in this district are coal pockets for a coal breaker at St. Nicholas, Pa., requiring 150 to 200 tons of plates; 12 locomotives for the Delaware, Lackawanna & Western, 20 for the Lehigh Valley and eight for export to China, on which the Baldwin Locomotive Works is bidding. The only substantial fabricated structural steel projects awarded in the past week are 1500 tons for a bridge in West Philadelphia, placed with a Pittsburgh fabricator, and 500 tons for an addition to the Ford Motor Co. plant in Chester, Pa., placed with a Philadelphia shop.

New short-haul freight rates, effective today, Nov. 10, reduce the rate from Coatesville to Philadelphia on plates from the present 10½c. per 100 lb. to 8½c., and the 6c. per 100 lb. charge on structural shapes from Pencoyd, Pa., the nearest mill to consumers in Philadelphia, is reduced to 3c. per 100 lb. Other short-haul rates are reduced proportionately.

Pig Iron

Competition for foundry iron orders between eastern Pennsylvania and northern New York furnaces has resulted in the award of some fair tonnages by consumers, who apparently are convinced that current quotations offer a satisfactory level at which to buy. In certain instances consumers have doubled previous contracts to obtain the lower prices offered now. Meanwhile, some fair lots, ranging from 500 to 1000 tons, have been inquired for by stove, soil pipe and jobbing foundries in the Baltimore district. Eastern Pennsylvania quotations are generally $14.75 to $15, furnace, except for carload lots, on which a slightly higher price usually applies. Southern foundry iron continues at $11, Birmingham, a price which removes it from competition in eastern Pennsylvania. Basic iron continues quiet, as eastern Pennsylvania consumers are well stocked, based on present operating rates. The furnace at Swedeland, Pa., is still in blast, but expects to blow out this month. The northern New York furnace is expected to blow out by the end of the year.

Sheets

Local radio manufacturers are not expected to increase present operating rates for the rest of this year unless there is an unforeseen improvement in demand during the holiday season. Automobile body builders, however, are increasing production schedules and negotiating for medium-sized sheet tonnages. Small sheet metal working shops are also better engaged than for some months and are placing occasional small lots. Prices are being firmly maintained on all current buying, even when substantial orders are involved.

Bars, Plates and Shapes

Some consumers of steel bars have been specifying larger tonnages than for some months past. Demand for shapes has improved slightly from the smaller fabricating shops, but inquiry for plates has declined except for a few small projects requiring light material. Prices are generally unchanged, with bar quotations firm and plates and shapes subject to occasional concessions of $1 a ton for desirable orders.

Imports

In the week ended Nov. 7, 1000 tons of pig iron arrived at this port from British India and 86 tons of structural shapes from Germany.

Old Material

All grades of scrap are inactive and prices generally unchanged. No. 1 heavy melting steel is moving to the consumer at Coatesville, Pa., and a small tonnage of No. 2 steel to Conshohocken. Otherwise the market is extremely quiet.

▲ ▲ ▲

St. Louis Stove and Implement Manufacturers Expected to Be Helped by Rise in Grain Prices

ST. LOUIS, Nov. 10.—First among the melters of pig iron likely to be affected by the rise in prices of farm products are implement and stove manufacturers, and these industries are said to be in a more cheerful mood than for some time. The implement manufacturers are expected to resume operations by Nov. 15, while the manufacturers of heaters such as are used on farms and in the smaller cities feel that the situation will result in the movement of considerable merchandise from the stocks of retailers and cause a good replacement business. The melt of basic iron is said to be the lowest in years, and the jobbing foundries are doing very little. The market continues firm at unchanged prices—$17.50, f.o.b. Granite City, and $17, Chicago, for Northern iron, and $11, Birmingham, for Southern.

Finished Steel

The rise in the price of crude oil has caused a quickening of inquiries for tank plates for the Oklahoma and Texas fields, which has been encouraging to mills, but no sizable tonnages have been placed. The improved oil situation has also caused a more hopeful attitude among jobbers, whose business in October was about equal to that of September. Shapes and sheets are only in light demand.

The Union Electric Light & Power Co. awarded 300 tons of angles for transmission towers to the Missouri Rolling Mills Corpn. The only construction work here before the trade is the Biddle Street Market, which will require 120 tons of structural steel.

The trade is expecting bids to be asked for shortly for the North American Building, and an approach to the municipal bridge, which are the only large projects in sight.

Old Material

Dealers of scrap iron are merely marking time, awaiting a resumption of buying activities by the mills, which, in turn, are awaiting orders for their finished products. Nos. 1 and 2 heavy melting steel and railroad springs are 25c. a ton lower. Railroad lists: Chesapeake & Ohio, 10,000 tons; Wabash, 1285 tons; Chicago, Milwaukee, St. Paul & Pacific, 1100 tons; New York, Chicago & St. Louis, 34 carloads; St. Louis-San Francisco, 27 carloads, and the Alton, 12 carloads.

Canada Sees Business Outlook More Hopeful

TORONTO, Nov. 9.—Industrial activities are beginning to show a more hopeful trend. Of special significance is the fact that within the past week or two a number of plants that were shut down or on greatly reduced schedules have resumed operations, and others have announced that their plants will be in operation again soon. Another promising indication of early improvement is revealed in the announcements regarding new plants to be erected, particularly by United States concerns.

Pig Iron

Demand is dull, and melters are showing no interest outside small tonnage lots for spot needs. Production also is at its lowest point in several years. Prices remain unchanged.

Old Material

The demand for steel scrap is negligible; only occasional orders are being closed for heavy melting steel or turnings. Iron scrap also is moving somewhat sluggishly. Dealers are still out of the market and have not revised price lists.

▲ ▲ ▲

Lower Freight Rates for Short Haul in Effect

WASHINGTON, Nov. 10.—Reduced short-haul rates on iron and steel products went into effect today in Central and Trunk Line territories. The Interstate Commerce Commission declined to suspend the rates, which it had been asked to do by cast iron pipe manufacturers along the Atlantic Seaboard.

Cast iron pipe is not included in the scale of reduced short-haul rates. This is due to the fact that in its decision in the Krupp Foundry Co. case the commission established rates in the North and South which set up a definite relationship. The railroads said to reduce rates on cast iron pipe in the North would be in violation of the commission's decision by disturbing the rate relationship.

▲ ▲ ▲

Yale & Towne Mfg. Co. in New Philadelphia Plant

The entire materials handling equipment department of the Yale & Towne Mfg. Co. is now concentrated at its Philadelphia plant. The manufacturing of three different types of materials handling equipment—hand and electric chain hoists, overhead conveying systems and electric industrial trucks, two types of equipment which were formerly manufactured at the Stamford, Conn., plant, and the Stuebing line of hand lift trucks formerly made at Holyoke, Mass., and Cincinnati plants—is now concentrated in the Philadelphia division.

The new Yale & Towne plant at Philadelphia was planned to permit the economical production of a large volume of three types of equipment. The plant extends over an area of about four acres and comprises 22 individual buildings. All machining and assembling is done on one floor. In the same building are hoist testing machines capable of testing complete chain hoists of from ¼ ton to 40 tons capacity.

Another interesting development is the procedure involved in the manufacture of Yale steel load and hand chain, the cutting off, forming, welding, gauging, heat treating, tumbling and final inspection being concentrated on one floor. When this division was located at Stamford, the various processes of chain manufacture occupied parts of six floors.

▲ ▲ ▲

Wire Netting Held to Be Dutiable at 40 Per Cent

WASHINGTON, Nov. 10.—The United States Court of Customs and Patent Appeals has affirmed a ruling of the United States Customs Court that wire netting used in reinforcing stucco is dutiable at 40 per cent as manufactures of steel. The European Trading Co. had protested that the product was dutiable at 20 per cent as structural steel.

▲ ▲ ▲

Chicago Switching Case to Be Reopened

WASHINGTON, Nov. 10.—The Interstate Commerce Commission has reopened the Chicago switching district case for further hearing. The hearing will be held to determine whether or not the adjustment of interstate and intrastate rates is discriminatory against the former.

▲ ▲ ▲

Industrial Finances

The American Rolling Mill Co. reports a net loss for nine months of 1931 of $1,300,219 after allowances for depreciation, interest and taxes. In the corresponding period of 1930 the company made a net profit of $1,962,905, equivalent to $1.11 a share on the common.

▲ ▲ ▲

Interlake Iron Corpn. for the three months ended Sept. 30 reports a net loss of $309,725 after all charges and taxes. This compares with net loss of $264,762 in the preceding quarter and with net profit of $352,112, equal to 17c. a share on 2,000,000 shares, in the 1930 quarter. Operations for the nine months resulted in net loss of $505,032, against a net profit of $1,649,652, or 82c. a share, in the 1930 period.

Unfilled Orders Drop 25,401 Tons

Unfilled orders of the United States Steel Corpn., as of Oct. 31, amounted to 3,119,432 tons. This represents a drop of 25,401 tons from the total on Sept. 30. The average change during October, for 1910 to 1930 inclusive, was an increase of about 39,000 tons. In the 10 years 1921 to 1930 the average increase was about 59,000 tons.

Unfilled orders at end of each month since the beginning of 1929 follow:

	1931	1930	1929
January	4,132,351	4,468,710	4,109,487
February	3,965,194	4,479,748	4,144,341
March	3,995,330	4,570,653	4,410,718
April	3,897,729	4,354,220	4,427,763
May	3,620,452	4,059,227	4,304,167
June	3,479,323	3,968,064	4,256,910
July	3,406,816	4,022,055	4,088,177
August	3,169,457	3,580,204	3,658,211
September	3,144,833	3,424,338	3,902,581
October	3,119,432	3,481,763	4,086,562
November	.....	3,639,636	4,125,345
December	.....	3,943,596	4,417,193

▲ ▲ ▲

Wrought Iron Sheets Again Available

Genuine wrought iron sheets, which have not been manufactured on a commercial basis for many years, have again been placed on the market for roofing and siding and other uses where corrosion resistance is desirable, by the A. M. Byers Co., Pittsburgh. In making this announcement, L. F. Rains, president of the Byers company, states that this new development is in line with the policy of the company to extend the uses of wrought iron.

Wrought iron sheets are being made at the plant of the Canonsburg Steel & Iron Works, Canonsburg, Pa., and are being rolled from 10 to 28 gage, up to 38 in. wide and in lengths up to 144 in. A base price on black sheets of $3.70 a 100 lb. in carloads, and $4.10 in less than carloads has been established, with the usual sheet extras for gage, width, length and cutting. Galvanized sheets will carry a base price of $4.45 a 100 lb. in carloads and $4.85 in less than carloads.

▲ ▲ ▲

Philadelphia Steel Club Elects Officers

At a meeting of the Steel Club of Philadelphia on Tuesday the following officers were elected for the ensuing year: T. C. Ham, Jones & Laughlin Steel Corpn., president; William O. Lange, Phoenix Iron Co., vice-president; F. L. Stephenson, Bethlehem Steel Co., secretary and treasurer. Alexander Cameron, Lukens Steel Co., and Horace Merriman, Alan Wood Steel Co., were elected to the board of governors.

Tin, Lead, Zinc and Antimony Prices Up; Copper Export Sales Increase

NEW YORK, Nov. 10.—A new buying movement from abroad has developed in the copper market since Nov. 4, so that export sales of electrolytic copper for November, including today, are in excess of 10,000 tons. The price of Copper Exporters, Inc., continues at 7.50c. a lb., c.i.f. usual European ports, and, with the domestic level unchanged at 7c., delivered, custom smelters are more interested in booking the profitable export business than in seeking domestic orders, many of which are for forward delivery. Primary producers are participating in present export business, but are maintaining a minimum domestic quotation of 7.25c., delivered. Domestic sales in the past week have been larger and mostly for delivery through the first quarter. Much of the present optimism in the copper market, here and abroad, is attributed to anticipation of some degree of success from the current international negotiations to restrict production. Lake copper is in moderate demand, and prices continue at 7.25c. to 7.37½c., delivered.

Tin

Stimulated by the strength of other metal and commodity markets, tin consumers have been actively buying for delivery in the first quarter, evidently seeing tin as an advantageous purchase at today's price level. This sudden increase of activity here and abroad has resulted in an advance in the domestic quotation from 22.15c., New York, on Nov. 4, to 23.65c., today. In the same period, the London price for future standard tin has increased £6 7s. 6d. a ton. London prices today are £134 10s. for spot standard, £136 10s. for future standard, £137 15s. for spot Straits, and the Singapore price is £138 15s. a ton. With no shipments of tin to the United States in the past week, stocks in United Kingdom warehouses are up 492 tons this week to a total of 30,253 tons. Shipments from Singapore to Nov. 7 total 1456 tons. Some of the present strength of the tin market is attributed to action by the Malay Government, cooperating with the International Tin Committee, in buying excess production from the more than 1200 small Malay producers.

Lead

Demand has been heavy in the past week, and a substantial tonnage of lead has been sold to various consuming industries for prompt and December delivery, resulting in an advance of $2 a ton, on Nov. 9, to 3.95c., New York, and 3.75c., St. Louis. Today, the market was again advanced, the New York price having been increased $2 a ton to 4.05c. a lb., while the St. Louis price went up $3 a ton, to 3.90c., St. Louis. Although consumers have inquired for delivery into the first quarter of next year, sellers are confining transactions to November and December delivery. The leading factor in the Western market has endeavored to adopt a policy of selling only current intake, and is generally accepting only part of the tonnage for which consumers inquire.

Zinc

Although October zinc statistics show an increase of 511 tons in stock, the gain is generally viewed as much smaller than had been expected. Following a period of inactivity and declining prices, buyers returned to the market last week and a fair tonnage of distress metal was moved, placing the market in a much more favorable position technically. The price in St. Louis was advanced from 3.15c., on Nov. 5, to 3.17½c., on Nov. 6, to 3.20c., on Nov. 9, and to 3.25c. today. Demand continues substantial, and sellers are asking the usual $1 a ton advance, or 3.30c. a lb., St. Louis, for December delivery.

Antimony

Although buyers show no greater interest in either the Chinese metal or the product of the Laredo, Tex., smelter, the price has advanced rapidly during the week from 6.55c. to 6.85c. per lb., c.i.f. New York, duty paid. This upward movement is the result of a considerably stronger silver market. While importers have not had occasion to quote for future delivery, they place the forward market at about 6.75c., duty paid, New York.

The Week's Prices. Cents Per Pound for Early Delivery

	Nov. 10	Nov. 9	Nov. 7	Nov. 6	Nov. 5	Nov. 4
Lake copper, New York	7.37½	7.37½	7.37½	7.37½	7.37½	7.37½
Electrolytic copper, N. Y.*	6.75	6.75	6.75	6.75	6.75	6.75
Straits tin, spot, N. Y.	23.65	23.50	....	23.00	22.37½	22.15
Zinc, East St. Louis	3.25	3.20	3.17½	3.17½	3.15	3.15
Zinc, New York	3.60	3.55	3.52½	3.52½	3.50	3.50
Lead, St. Louis	3.90	3.75	3.65	3.65	3.65	3.65
Lead, New York	4.05	3.95	3.85	2.85	3.85	3.85

*Refinery quotation; price ¼c. higher delivered in the Connecticut valley.
Aluminum, 98 to 99 per cent pure, 22.90c. a lb., delivered.
Nickel electrolytic cathode, 35c. a lb., delivered; shot and ingot, 36c. a lb., delivered.
Antimony, 6.85c. a lb., New York.

New York, Chicago or Cleveland Warehouse

Delivered Prices, Base per Lb.

High brass	13.00c.
*Copper, hot rolled, base sizes, 1000 lb. and more	16.12½c.
Seamless Tubes—	
Brass	16.25c.
Copper	15.62½c.
Brass Rods	10.75c.
Brazed Brass Tubes	21.75c.

*Extra for cold-rolled, 3c. per lb.

New York Warehouse

Delivered Prices, Base per Lb.

Zinc sheets (No. 9), casks	9.25c. to 9.50c.
Zinc sheets, open	10.25c. to 10.50c.

Metals from New York Warehouse

Delivered Prices, per Lb.

Tin, Straits pig	25.75c. to 26.75c.
Tin, bar	27.75c. to 29.75c.
Copper, Lake	9.00c. to 10.00c.
Copper, electrolytic	8.50c. to 9.00c.
Copper, casting	8.25c. to 8.75c.
Zinc, slab	4.75c. to 5.25c.
Lead, American pig	4.75c. to 5.75c.
Lead, bar	6.50c. to 7.50c.
Antimony, Asiatic	9.00c. to 10.00c.
Aluminum No. 1 ingots for remelting (guaranteed over 99% pure)	20.00c. to 23.00c.
Alum. ingots, No. 12 alloy	19.00c. to 21.00c.
Babbitt metal, commercial grade	19.00c. to 29.00c.
Solder, ½ and ¼	16.75c. to 17.75c.

Metals from Cleveland Warehouse

Delivered Prices, per Lb.

Tin, Straits pig	27.25c.
Tin, bar	29.25c.
Copper, Lake	8.37½c.
Copper, electrolytic	8.37½c.
Copper, castings	8.00c.
Zinc, slab	5.00c.
Lead, American pig	4.60c. to 4.75c.
Lead, bar	7.75c.
Antimony, Asiatic	10.00c.
Babbitt metal, medium grade	15.00c.
Babbitt metal, high grade	31.25c.
Solder, ½ and ½	19.00c.

Old Metals, Per Lb., New York

Buying prices represent what large dealers are paying for miscellaneous lots from smaller accumulators and selling prices are those charged consumers after the metal has been properly prepared for their uses. (All prices are nominal because of uncertain condition of market.)

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible	5.25c.	6.00c.
Copper, hvy. and wire	5.00c.	5.75c.
Copper, light and bottoms	4.25c.	5.00c.
Brass, heavy	2.75c.	3.50c.
Brass, light	2.25c.	3.00c.
Hvy. machine composition	4.00c.	4.75c.
No. 1 yel. brass turnings	3.00c.	3.50c.
No. 1 red brass or compos. turnings	3.75c.	4.50c.
Lead, heavy	2.75c.	3.25c.
Zinc	1.25c.	1.75c.
Sheet aluminum	9.00c.	11.00c.
Cast aluminum	3.25c.	5.00c.

Semi-Finished Steel, Raw Materials, Bolts and Rivets

MILL PRICES OF SEMI-FINISHED STEEL

Billets and Blooms

	Per Gross Ton
Rerolling, 4-in. and under 10-in., Pittsburgh	$29.00
Rerolling, 4-in. and under 10-in., Youngstown	29.00
Rerolling, 4-in. and under 10-in., Cleveland	29.00
Rerolling, 4-in. and under 10-in., Chicago	31.00
Forging quality, Pittsburgh	35.00

Sheet Bars

(Open-Hearth or Bessemer)

	Per Gross Ton
Pittsburgh	$29.00
Youngstown	29.00
Cleveland	29.00

Slabs

(8 in. x 2 in. and under 10 in. x 10 in.)

	Per Gross Ton
Pittsburgh	$29.00
Youngstown	29.00
Cleveland	29.00

Skelp

(F.o.b. Pittsburgh or Youngstown)

	Per Lb.
Grooved	1.60c.
Universal	1.60c.
Sheared	1.60c.

Wire Rods

(Common soft, base)

	Per Gross Ton
Pittsburgh	$35.00
Cleveland	35.00
Chicago	36.00

PRICES OF RAW MATERIAL

Ores

Lake Superior Ores, Delivered Lower Lake Ports

	Per Gross Ton
Old range Bessemer, 51.50% iron	$4.80
Old range non-Bessemer, 51.50% iron	4.65
Mesabi Bessemer, 51.50% iron	4.65
Mesabi non-Bessemer, 51.50% iron	4.50
High phosphorus, 51.50% iron	4.40

Foreign Ore, c.i.f. Philadelphia or Baltimore

	Per Unit
Iron ore, low phos., copper free, 55 to 58% iron, dry, Spanish or Algerian	8c. to 9c.
Iron ore, low phos., Swedish, average 68% iron	10.00c.
Iron ore, basic or foundry, Swedish, average 65% iron	9.00c.
Iron ore, basic and foundry, Russian, average 63% iron	9.00c.
Manganese ore, washed 52% manganese, from the Caucasus	25c. to 26c.
Manganese ore, African or Indian, 50 to 52%	23c. to 24c.
Manganese ore, Brazilian, 46 to 48%	22c. to 23c.
Tungsten ore, high grade, per unit, in 60% concentrates	$12.00 to $12.50

	Per Gross Ton
Chrome ore, 45% Cr_2O_3 crude, c.i.f. Atlantic seaboard	$20.00
Chrome ore, 48% Cr_2O_3, c.i.f. Atlantic seaboard	22.50

Coke

	Per Net Ton	
Furnace, f.o.b. Connellsville prompt	$2.40	
Foundry, f.o.b. Connellsville prompt	$3.25 to	4.50
Foundry, by-product, Ch'go ovens		7.50
Foundry, by-product, New England, del'd		10.50
Foundry, by-product, Newark or Jersey City, delivered	8.70 to	9.10
Foundry, by-product, Phila		9.00
Foundry, Birmingham		5.00
Foundry, by-product, St. Louis, f.o.b. ovens		8.00
Foundry, by-product, del'd St. Louis		9.00

Coal

	Per Net Ton	
Mine run steam coal, f.o.b. W. Pa. mines	$1.40 to	$1.50
Mine run coking coal, f.o.b. W. Pa.	1.50 to	1.60
Gas coal, 3¼-in., f.o.b. Pa. mines	1.70 to	1.80
Mine run gas coal, f.o.b. Pa. mines	1.50 to	1.60
Steam slack, f.o.b. W. Pa. mines	.30 to	.40
Gas slack, f.o.b. W. Pa. mines	.50 to	.70

Ferromanganese

	Per Gross Ton
Domestic, 80%, seaboard	*$80.00 to $85.00
Foreign, 80%, Atlantic or gulf port, duty paid	*80.00 to 85.00

*Minimum price quoted for lots of 2000 tons or more.

Spiegeleisen

	Per Gross Ton Furnace
Domestic, 19 to 21%	$28.00 to $30.00

Electric Ferrosilicon

	Per Gross Ton Delivered
50%	$83.50
75%	130.00

10%	*Per Gross Ton Furnace*	12%	*Per Gross Ton Furnace*
	$35.00		$39.00
11%	37.00	14 to 16%	31.00

Bessemer Ferrosilicon

F.o.b. Jackson County, Ohio, Furnace

10%	*Per Gross Ton*	13%	*Per Gross Ton*
	$25.00		$29.00
11%	26.00	14%	31.00
12%	27.00	15%	33.00

Silvery Iron

F.o.b. Jackson County, Ohio, Furnace

6%	*Per Gross Ton*	11%	*Per Gross Ton*
	$20.00		$23.00
7%	20.50	12%	24.00
8%	21.00	13%	26.00
9%	21.50	14%	28.00
10%	22.00	15%	30.00

Other Ferroalloys

Ferrotungsten, per lb. contained metal del'd, carloads	$1.08
Ferrotungsten, less carloads	$1.15 to 1.25
Ferrochromium, 4 to 6% carbon and up, 65 to 70% cr., per lb. contained Cr. delivered, in carloads	11.00c.
Ferrochromium, 2% carbon	17.00c. to 17.50c.
Ferrochromium, 1% carbon	19.00c. to 20.00c.
Ferrochromium, 0.10% carbon	24.50c. to 26.00c.
Ferrochromium, 0.06% carbon	26.50c. to 28.00c.
Ferrovanadium, per lb. contained vanadium, f.o.b. furnace	$3.15 to $3.65
Ferrocarbontitanium, 15 to 18%, per net ton, f.o.b. furnace, in carloads	160.00
Ferrophosphorus, electric or blast furnace material, in carloads, 18%, Rockdale, Tenn., base per gross ton	91.00
Ferromolybdenum, per lb. contained Mo., delivered	1.00
Calcium molybdate, per lb. contained Mo., delivered	85c.
Ferrophosphorus, electric, 24%, f.o.b. Anniston, Ala., per gross ton	$122.50
Silico spiegel, per ton, f.o.b. furnace, car lots	42.50
Ton lots or less, per ton	47.50
Silico-manganese, gross ton, delivered: 2.50% carbon grade	105.00
1% carbon grade	115.00
Spot prices	$5 a ton higher

Fluxes and Refractories

Fluorspar

	Per Net Ton
Domestic, 85% and over calcium fluoride, not over 5% silicon, gravel, f.o.b. Illinois and Kentucky mines	$13.00
No. 2 lump, Illinois and Kentucky mines	17.00
Foreign, 85% calcium fluoride, not over 5% silicon, c.i.f. Atlantic port, duty paid	17.00
Domestic, No. 1 ground bulk, 95 to 98% calcium fluoride, not over 2½% silicon, f.o.b. Illinois and Kentucky mines	32.00

Fire Clay Brick

Per 1000 f.o.b. Works

	High-Heat Duty Brick	Intermediate Heavy Duty Brick
Pennsylvania	$40.00	$32.00 to $35.00
Maryland	40.00	32.00 to 35.00
New Jersey	$44.00 to 59.00	
Ohio	40.00	32.00 to 35.00
Kentucky	40.00	32.00 to 35.00
Missouri	37.00	32.00 to 35.00
Illinois	40.00	32.00 to 35.00
Ground fire clay, per ton	6.50	

Silica Brick

	Per 1000 f.o.b. Works
Pennsylvania	$40.00
Chicago	49.00
Birmingham	50.00
Silica clay, per ton	8.00

Magnesite Brick

	Per Net Ton
Standard sizes, f.o.b. Baltimore and Chester, Pa.	$65.00
Grain magnesite, f.o.b. Baltimore and Chester, Pa.	40.00

Chrome Brick

	Per Net Ton
Standard size	$45.00

MILL PRICES OF BOLTS, NUTS, RIVETS AND SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

	Per Cent Off List
†Machine bolts	73 and 10
†Carriage bolts	73 and 10
Lag bolts	73 and 10
Plow bolts, Nos. 1, 2, 3 and 7 heads	73 and 10
Hot-pressed nuts, blank or tapped, square	73 and 10
Hot-pressed nuts, blank or tapped, hexagons	73 and 10
C.p.c. and t. square or hex. nuts, blank or tapped	73 and 10
Washers*	7.00c. to 6.75c. per lb. off list

*F.o.b. Chicago, New York and Pittsburgh.
†Bolts with rolled thread up to and including ⅝ in. x 6 in. take 10 per cent lower list prices.

Bolts and Nuts

	Per Cent Off List
Semi-finished hexagons nuts	73 and 10
Semi-finished hexagons castellated nuts, S.A.E.	73 and 10
Stove bolts in packakes, P'gh.	80, 10, 10, 10 and 5
Stove bolts in packages, Ch'go.	80, 10, 10, 10 and 5
Stove bolts in pkgs., Cleveland.	80, 10, 10, 10 and 5
Stove bolts in bulk, P'gh.	80, 10, 10, 10, 5 and 2½
Stove bolts in bulk, Ch'go.	80, 10, 10, 10, 5 and 2½
Stove bolts in bulk, Cleveland.	80, 10, 10, 10, 5 and 2½
Tire bolts	60, 10 and 10

Discounts of 73 and 10 per cent off on bolts and nuts apply on carload business with jobbers and large consumers.

Large Rivets

(½-in. and larger)

	Base per 100 Lb.
F.o.b. Pittsburgh or Cleveland	$2.25
F.o.b. Chicago	2.35

Small Rivets

(7/16-in. and smaller)

	Per Cent Off List
F.o.b. Pittsburgh	70, 10 and 5
F.o.b. Cleveland	70, 10 and 5
F.o.b. Chicago	70, 10 and 5

Cap and Set Screws

(Freight allowed up to but not exceeding 50c. per 100 lb. on lots of 200 lb. or more)

	Per Cent Off List
Milled cap screws	80, 10, 10 and 5
Milled standard set screws, case hardened	80 and 5
Milled headless set screws, cut thread	75 and 10
Upset hex. head cap screws, U.S.S.S. thread	85 and 10
Upset hex. cap screws, S.A.E. thread	85 and 10
Upset set screws	80, 10 and 5
Milled studs	70

Mill Prices of Finished Iron and Steel Products

Iron and Steel Bars

Soft Steel

	Base per Lb.
F.o.b. Pittsburgh mill	1.60c.
F.o.b. Chicago	1.70c.
Del'd Philadelphia	1.89c.
Del'd New York	1.93c.
F.o.b. Cleveland	1.65c.
F.o.b. Lackawanna	1.70c.
F.o.b. Birmingham	1.70c.
C.i.f. Pacific ports	2.00c.

Billet Steel Reinforcing

F.o.b. P'gh mills, 40, 50, 60-ft.	1.60c.
F.o.b. Birmingham, mill lengths	1.75c.
F.o.b. Cleveland	1.50c. to 1.55c.

Rail Steel

F.o.b. mills, east of Chicago dist.	1.30c. to 1.35c.
F.o.b. Chicago Heights mill	1.50c. to 1.60c.
Del'd Philadelphia	1.49c. to 1.59c.

Iron

Common iron, f.o.b. Chicago	1.70c.
Refined iron, f.o.b. P'gh mills	2.75c.
Common iron, del'd Philadelphia	2.09c.
Common iron, del'd New York	2.14c.

Tank Plates

	Base per Lb.
F.o.b. Pittsburgh mill	1.60c.
F.o.b. Chicago	1.70c.
F.o.b. Birmingham	1.70c.
Del'd Cleveland	1.78½c.
Del'd Philadelphia	1.80½c.
F.o.b. Coatesville	1.70c.
F.o.b. Sparrows Point	1.70c.
F.o.b. Lackawanna	1.70c.
Del'd New York	1.88c.
C.i.f. Pacific ports	1.85c. to 1.90c.

Structural Shapes

	Base per Lb.
F.o.b. Pittsburgh mill	1.60c.
F.o.b. Chicago	1.70c.
F.o.b. Birmingham	1.70c.
F.o.b. Lackawanna	1.70c.
F.o.b. Bethlehem	1.70c.
Del'd Cleveland	1.78½c.
Del'd Philadelphia	1.71c. to 1.76c.
Del'd New York	1.85½c.
C.i.f. Pacific ports	2.05c.

Hot-Rolled Hoops, Bands and Strips

	Base per Lb.
6 in. and narrower, Pittsburgh	1.60c. to 1.65c.
Wider than 6 in., P'gh	1.50c. to 1.55c.
6 in. and narrower, Chicago	1.70c. to 1.75c.
Wider than 6 in., Chicago	1.60c. to 1.65c.
Cooperage stock, P'gh	1.75c. to 1.85c.
Cooperage stock, Chicago	1.85c. to 1.95c.

Cold-Finished Steel

	Base per Lb.
Bars, f.o.b. Pittsburgh mill	2.10c.
Bars, f.o.b. Chicago	2.10c.
Bars, Cleveland	2.10c.
Bars, Buffalo	2.10c.
Shafting, ground, f.o.b. mill	*2.45c. to 3.40c.
Strips, P'gh	2.05c. to 2.15c.
Strips, Cleveland	2.05c. to 2.15c.
Strips, deliv'd Chicago	2.33c. to 2.43c.
Strips, Worcester	2.30c.
Fender stock, No. 20 gage, Pittsburgh or Cleveland	3.10c. to 3.20c.

*According to size.

Wire Products

(Carload lots, f.o.b. Pittsburgh and Cleveland)

To Manufacturing Trade

Bright wire	2.20c.
Spring wire	3.20c.

To Jobbing Trade

	Base per Keg
Standard wire nails	$1.90
Smooth coated nails	1.90
Galvanized nails	3.90

	Base per Lb.
Smooth annealed wire	2.35c.
Smooth galvanized wire	2.80c.
Polished staples	2.35c.
Galvanized staples	2.60c.
Barbed wire, galvanized	2.55c.
Woven wire fence, Nos. 9 and 11 gage, per net ton	$55.00
Woven wire fence, No. 12½ gage and lighter, per net ton	60.00

To Retail Trade

	Base per Keg
Standard wire nails	$2.00
Cement coated nails	2.00
Galvanized nails	4.00

	Base per Lb.
Smooth annealed wire	2.45c.
Smooth galvanized wire	2.90c.
Polished staples	2.45c.
Galvanized staples	2.70c.
Barbed wire, galvanized	2.65c.
Woven wire fence, Nos. 9 and 11 gage, per net ton	$60.00
Woven wire fence, 12½ gage and lighter, per net ton	65.00

Anderson, Ind., mill prices are ordinarily $1 a ton over Pittsburgh base; Duluth, Minn., and Worcester, Mass., mill $2 a ton over Pittsburgh, and Birmingham mill $3 a ton over Pittsburgh.

Sheets

Hot-Rolled

	Base per Lb.
No. 10, f.o.b. Pittsburgh	1.70c.
No. 10, f.o.b. Chicago mills	1.80c.
No. 10, del'd Philadelphia	1.99c.
No. 10, f.o.b. Birmingham	1.85c.
No. 10, c.i.f. Pacific Coast ports	2.33c.

Hot-Rolled and Annealed

No. 10, Pittsburgh	1.85c.
No. 10, Chicago mills	1.95c.
No. 10, Birmingham	2.00c.

Hot-Rolled Annealed

No. 24, f.o.b. Pittsburgh	2.40c.
No. 24, f.o.b. Chicago mills	2.50c.
No. 24, del'd Philadelphia	2.69c.
No. 24, f.o.b. Birmingham	2.55c.
No. 24, c.i.f. Pacific Coast ports	2.88c.

Heavy Cold-Rolled

No. 10 gage, f.o.b. Pittsburgh	2.35c.
No. 10 gage, f.o.b. Chicago mills	2.45c.
No. 10 gage, del'd Philadelphia	2.64c.

Light Cold-Rolled

No. 20 gage, f.o.b. Pittsburgh	2.95c.
No. 20 gage, f.o.b. Chicago mills	3.05c.
No. 20 gage, del'd Philadelphia	3.24c.

Automobile Body Sheets

No. 20, f.o.b. Pittsburgh	3.10c.

Steel Furniture Sheets

No. 10, f.o.b. Pittsburgh	2.75c.
No. 20, f.o.b. Pittsburgh	3.35c.

(Prices on furniture stock include stretcher leveling but not resquaring.)

Galvanized Sheets

No. 24, f.o.b. Pittsburgh	2.90c.
No. 24, f.o.b. Chicago mills	3.00c.
No. 24, del'd Philadelphia	3.19c.
No. 24, f.o.b. Birmingham	3.05c.
No. 24, c.i.f. Pacific Coast ports	3.38c.

Long Ternes

No. 24, unassorted, 8-lb. coating, f.o.b. P'gh	3.15c.

Vitreous Enameling Stock

No. 10, f.o.b. Pittsburgh	2.90c.
No. 20, f.o.b. Pittsburgh	3.40c.

Tin Mill Black Plate

No. 28, f.o.b. Pittsburgh	2.65c.
No. 28, Chicago mills	2.75c.

Tin Plate

	Base per Box
Standard cokes, f.o.b. P'gh district mills	$4.75
Standard cokes, f.o.b. Gary	4.85

Terne Plate

(F.o.b. Morgantown or Pittsburgh)

(Per Package, 20 x 28 in.)

8-lb. coating I.C.	$10.30
15-lb. coating I.C.	12.90
20-lb. coating I.C.	14.00
25-lb. coating I.C.	$15.20
30-lb. coating I.C.	16.00
40-lb. coating I.C.	17.80

Alloy Steel Bars

(F.o.b. maker's mill)

Alloy Quantity Bar Base, 2.65c. per Lb.

S.A.E. Series Numbers		Alloy Differential per 100 Lb.
2000	(¾% Nickel)	$0.25
2100	(1¼% Nickel)	0.55
2300	(3½% Nickel)	1.50
2500	(5% Nickel)	2.25
3100	Nickel Chromium	0.55
3200	Nickel Chromium	1.35
3300	Nickel Chromium	3.80
3400	Nickel Chromium	3.20
4100	Chromium Molybdenum (0.15 to 0.25 Molybdenum)	0.50
4100	Chromium Molybdenum (0.25 to 0.40 Molybdenum)	0.70
4600	Nickel Molybdenum (0.20 to 0.30 Molybdenum, 1.25 to 1.75 Nickel)	1.05
5100	Chromium Steel (0.60 to 0.90 Chromium)	0.35
5100	Chromium Steel (0.80 to 1.10 Chromium)	0.45
5100	Chromium Spring Steel	0.20
6100	Chromium Vanadium Bar	1.20
6100	Chromium Vanadium Spring Steel	0.95
9250	Silicon Manganese Spring Steel (flats)	0.25
	Rounds and squares	0.50
	Chromium Nickel Vanadium	1.50
	Carbon Vanadium	0.95

Above prices are for hot-rolled steel bars, forging quality. The differential for cold-drawn bars is ¾c. a lb. higher, with standard classification for cold-finished alloy steel bars applying. For billets 4 x 4 to 10 x 10 in., the price for a gross ton is the net price for bars of the same analysis.

Billets under 4 x 4 in. carry the steel bar base. Slabs with a section area of 16 in. or over carry the billet price. Slabs with sectional area of less than 16 in. or less than 2½ in. thick, regardless of sectional area, take the bar price.

Rails

	Per Gross Ton
Standard, f.o.b. mill	$43.00
Light (from billets), f.o.b. mill	34.00
Light (from rail steel), f.o.b. mill	32.00

Track Equipment

	Base per 100 Lb.
Spikes, ⅝-in. and larger	$2.70
Spikes, ½ in. and larger	2.70
Spikes, boat and barge	2.90
Tie plate, steel	1.85
Angle bars	2.75
Track bolts, to steam railroads	$3.80 to 4.00
Track bolts, to jobbers, all sizes, per 100 count	73 per cent off list

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

Butt Weld

Steel Inches	Black	Galv.	Iron Inches	Black	Galv.
⅛	47	21½	¼ and ⅜	+11	+36
¼ to ⅜	53	27½	½	23	5
½	58	44½	¾	28	11
¾	62	50½	1 and 1¼	31	15
1 to 3	64	52½	1½ and 2	35	18

Lap Weld

2	57	45½	2	23	9
2½ to 6	61	49½	2½ to 3½	28	13
7 and 8	58	45½	4 to 6	30	17
9 and 10	56	43½	7 and 8	29	16
11 and 12	55	42½	9 to 12	26	11

Butt Weld, extra strong, plain ends

⅛	43	26½	¼ and ⅜	+13	+48
¼ to ⅜	49	32½	½	23	7
½	55	44½	¾	28	12
¾	60	49½	1 to 2	34	18
1 to 1½	62	51½			
2 to 3	63	52½			

Lap Weld, extra strong, plain ends

2	55	44½	2	29	13
2½ to 4	59	48½	2½ to 4	34	20
4½ to 6	58	47½	4½ to 6	33	19
7 to 8	54	41½	7 and 8	31	17
9 and 10	47	34½	9 to 12	21	8
11 and 12	46	33½			

On carloads the above discounts on steel pipe are increased on black by one point, with supplementary discounts of 5 and 2½%, and on galvanized by 1½ points with supplementary discounts of 5 and 2½%. On iron pipe, both black and galvanized, the above discounts are increased to jobbers by one point with supplementary discounts of 5 and 2½%.

Note.—Chicago district mills have a base two points less than the above discounts. Chicago delivered base is 2½ points less. Freight is figured from Pittsburgh, Lorain, Ohio, and Chicago district mills, the billing being from the point producing the lowest price to destination.

Boiler Tubes

Base Discounts, f.o.b. Pittsburgh

Steel		Charcoal Iron	
2 in. and 2¼ in.	38	1¼ in.	1
2½ in.—2¾ in.	46	1¾ in.	8
3 in.	52	2 in.—2¼ in.	13
3¼ in.—3¾ in.	54	2½ in.—2¾ in.	16
4 in.	57	3 in.	17
4½ in. to 6 in.	46	3¼ in. to 3½ in.	18
		4 in.	20
		4½ in.	21

On lots of a carload or more, the above base discounts are subject to a preferential of two fives on steel and of 10 per cent on charcoal iron tubes. Smaller quantities are subject to the following modifications from the base discounts:

Lap Welded Steel—Under 10,000 lb., 6 points under base and one five; 10,000 lb. to carload, 4 points under base and two fives. Charcoal Iron—Under 10,000 lb., 2 points under base; 10,000 lb. to carload, base and one five.

Standard Commercial Seamless Boiler Tubes

Cold Drawn

1 in.	61	3 in.	46
1¼ to 1½ in.	53	3¼ to 3½ in.	48
1¾ in.	37	4 in.	51
2 to 2¼ in.	32	4½, 5 and 6 in.	40
2½ to 2¾ in.	40		

Hot Rolled

2 and 2¼ in.	38	3½ to 3½ in.	54
2½ and 2¾ in.	46	4 in.	57
3 in.	52	4½, 5 and 6 in.	46

Beyond the above base discounts a preferential discount of 5 per cent is allowed on carload lots. On less than carloads to 10,000 lb., base discounts are reduced 4 points with 5 per cent preferential; on less than 10,000 lb., base discounts are reduced 6 points, with no preferential. No extra for lengths up to and including 24 ft. Sizes smaller than 1 in. and lighter than standard gages take the mechanical tube list and discounts. Intermediate sizes and gages not listed take price of next larger outside diameter and heavier gage.

Seamless Mechanical Tubing

	Per Cent Off List
Carbon, 0.10% to 0.30% base (carloads)	55
Carbon, 0.30% to 0.40% base	50

Plus differential for lengths over 18 ft. and for commercial exact lengths. Warehouse discounts on small lots are less than the above.

Pig Iron Prices for All Districts

VALLEY

Per gross ton, f.o.b. Valley furnace:

Basic	$15.00
Bessemer	16.50
Gray forge	16.00
No. 2 foundry	16.00
No. 3 foundry	15.50
Malleable	16.50
Low phos., copper free	$26.66 to 27.00

Freight rate to Pittsburgh or Cleveland district, $1.76.

PITTSBURGH

Per gross ton, f.o.b. Pittsburgh district furnace:

Basic	$15.50 to $16.00
No. 2 foundry	17.00
No. 3 foundry	16.50
Malleable	17.00
Bessemer	17.00

Freight rates to points in Pittsburgh district range from 63c. to $1.13.

CHICAGO

Per gross ton at Chicago furnace:

N'th'n No. 2 fdy., sil. 1.75 to 2.25	$17.00
N'th'n No. 1 fdy., sil. 2.25 to 2.75	17.50
Malleable, not over 2.25 sil.	17.00
High phosphorus	17.00
Lake Super. charcoal, sil. 1.50	$25.04 to 27.04
S'th'n No. 2 fdy.	17.01
Low phos., sil. 1 to 2, copper free	28.50 to 29.20
Silvery, sil. 8 per cent	24.79 to 26.79
Bess. ferrosilicon, 14-15 per cent	35.79

Prices are delivered consumers' yards except on Northern foundry, high phosphorus and malleable, which are f.o.b. local furnaces, not including an average switching charge of 61c. per gross ton.

ST. LOUIS

Per gross ton at St. Louis:

No. 2 fdy., sil. 1.75 to 2.25 f.o.b. Granite City, Ill.	$17.50
Malleable, f.o.b. Granite City	17.50
N'th'n No. 2 fdy., del'd St. Louis	19.16
Southern No. 2 fdy., deliv'd	15.42
Northern malleable, deliv'd	19.16
Northern basic, deliv'd	19.16

Freight rates: 75c. (average) Granite City to St. Louis; $2.16 from Chicago; $4.42 from Birmingham.

NEW YORK

Per gross ton, delivered New York district:

*Buffalo No. 2, del'd east. N. J.	$17.78 to $18.28
East. Pa. No. 2 fdy., sil. 1.75 to 2.25	16.89 to 17.39
East. Pa. No. 2X fdy., sil. 2.25 to 2.75	17.89 to 18.39

Freight rates: $1.39 to $2.52 from eastern Pennsylvania.

*Prices delivered to New Jersey cities having rate of $3.28 a ton from Buffalo.

BUFFALO

Per gross ton, f.o.b. furnace:

No. 2 fdy., sil. 1.75 to 2.25	$17.00
No. 2X fdy., sil. 2.25 to 2.75	17.50
No. 1 fdy., sil. 2.75 to 3.25	18.50
Malleable, sil. up to 2.25	17.50
Basic	17.00
Lake Superior charcoal	25.28

NEW ENGLAND

Per gross ton delivered to most New England points:

*Buffalo, sil. 1.75 to 2.25	$19.91
*Buffalo, sil. 2.25 to 2.75	19.91
†Buffalo, sil. 1.75 to 2.25	19.28
†Buffalo, sil. 2.25 to 2.75	19.28
*Ala., sil. 1.75 to 2.25	$20.11 to 20.61
*Ala., sil. 2.25 to 2.75	20.61 to 21.11
†Ala., sil. 1.75 to 2.25	16.75
†Ala., sil. 2.25 to 2.75	17.25

Freight rates: $4.91 all rail and $4.28 rail and water from Buffalo; $9.61 all rail from Alabama and $5.75 rail and water from Alabama to New England seaboard.

*All rail rate.

†Rail and water rate.

CINCINNATI

Per gross ton, delivered Cincinnati:

Ala. fdy., sil. 1.75 to 2.25	$14.69
Ala. fdy., sil. 2.25 to 2.75	15.19
Tenn. fdy., sil. 1.75 to 2.25	14.69
S'th'n Ohio silvery, 8 per cent	23.89

Freight rates, $1.89 from Ironton and Jackson, Ohio; $3.69 from Birmingham.

PHILADELPHIA

Per gross ton at Philadelphia:

East. Pa. No. 2, 1.75 to 2.25 sil.	$15.51 to $16.01
East. Pa. No. 2X, 2.25 to 2.75 sil.	16.01 to 16.51
East. Pa. No. 1X	16.51 to 17.01
Basic (del'd east. Pa.)	16.25
Malleable	19.00
Stand. low phos. (f.o.b. east. Pa. furnace)	23.00 to 24.00
Cop. b'r'g low phos. (f.o.b. furnace)	22.00 to 23.00
Va. No. 2 plain, 1.75 to 2.25 sil.	22.04
Va. No. 2, 2.25 to 2.75 sil.	22.54

Prices, except as specified otherwise, are deliv'd Philadelphia. Freight rates: 76c. to $1.64 from eastern Pennsylvania furnaces; $4.54 from Virginia furnaces.

CLEVELAND

Per gross ton at Cleveland furnace:

N'th'n No. 2 fdy. (local delivery)	$17.00
S'th'n fdy., sil. 1.75 to 2.25	17.01
Malleable (local delivery)	17.00
Ohio silvery, 8 per cent	24.00
Stand. low phos., Valley	27.00

Prices are f.o.b. furnace except on Southern foundry and silvery iron. Freight rates: 50c. average local switching charge; $3 from Jackson, Ohio; $6.01 from Birmingham.

BIRMINGHAM

Per gross ton, f.o.b. Birmingham dist. furnaces:

No. 2 fdy., 1.75 to 2.25 sil.	$12.00
No. 1 fdy., 2.25 to 2.75 sil.	12.50
Basic	12.00

CANADA

Per gross ton:

Delivered Toronto

No. 1 fdy., sil. 2.25 to 2.75	$22.60
No. 2 fdy., sil. 1.75 to 2.25	22.10
Malleable	22.60

Delivered Montreal

No. 1 fdy., sil. 2.25 to 2.75	$24.00
No. 2 fdy., sil. 1.75 to 2.25	23.50
Malleable	24.00
Basic	$23.00 to 23.50

Old Material Quotations

PITTSBURGH

Per gross ton delivered consumers' yards in Pittsburgh and points taking the Pittsburgh district freight rate:

Basic Open-Hearth Grades:		
No. 1 heavy melting steel	$10.00 to	$10.50
No. 2 heavy melting steel	9.00 to	9.50
Scrap rails	10.00 to	10.50
Compressed sheet steel	9.75 to	10.25
Bundled sheets, sides and ends	9.00 to	9.50
Cast iron carwheels	10.50 to	11.00
Sheet bar crops, ordinary	11.00 to	11.50
Heavy breakable cast	8.00 to	8.50
No. 2 railroad wrought	10.00 to	10.50
Hvy. steel axle turnings	9.25 to	9.75
Machine shop turnings	7.00 to	7.50
Acid Open-Hearth Grades:		
Railr. knuckles and couplers	11.00 to	11.50
Railr. coil and leaf springs	11.00 to	11.50
Rolled steel wheels	11.00 to	11.50
Low phos. billet and bloom ends	13.00 to	13.50
Low phos. plate scrap	11.00 to	11.50
Low phos. sheet bar crops	12.50 to	13.00
Heavy steel axle turnings	9.00 to	9.50
Electric Furnace Grades:		
Low phos. punchings	12.50 to	13.00
Heavy steel axle turnings	9.00 to	9.50
Blast Furnace Grades:		
Short shoveling steel turnings	7.00 to	7.50
Short mixed borings and turnings	7.00 to	7.50
Cast iron borings	7.00 to	7.50
Rolling Mill Grades:		
Steel car axles	15.50 to	16.50
Cupola Grades:		
No. 1 cast	9.50 to	10.50
Rails 3 ft. and under	12.00 to	12.50

CHICAGO

Delivered Chicago district consumers:

Per Gross Ton

Basic Open-Hearth Grades:		
Heavy melting steel	$7.75 to	$8.25
Shoveling steel	7.75 to	8.25
Frogs, switches and guards, cut apart, and misc. rails	7.75 to	8.25
Factory hyd. comp. sheets	6.00 to	6.50
Drop forge flashings	5.50 to	6.00
No. 1 busheling	5.50 to	6.00
Forg'd cast and r'l'd steel carwheels	8.25 to	9.25
Railroad tires, charg. box size	9.00 to	9.50
Railroad leaf springs cut apart	9.50 to	10.00
Axle turnings	6.00 to	6.50
Acid Open-Hearth Grades:		
Steel couplers and knuckles	8.50 to	9.00
Coil springs	9.50 to	10.00
Electric Furnace Grades:		
Axle turnings	6.00 to	6.50
Low phos. punchings	10.00 to	10.50
Low phos. plates, 12 in. and under	9.00 to	9.50
Blast Furnace Grades:		
Cast iron borings	4.00 to	4.50
Short shoveling turnings	4.00 to	4.50
Machine shop turnings	4.00 to	4.50
Rolling Mill Grades:		
Rerolling rails	10.00 to	10.50
Cupola Grades:		
Steel rails, less than 3 ft.	9.25 to	9.75
Steel rails, less than 2 ft.	10.00 to	10.50
Angle bars, steel	8.50 to	9.00
Cast iron carwheels	9.00 to	9.50
Malleable Grades:		
Railroad	7.00 to	7.50
Agricultural	7.00 to	7.50
Miscellaneous:		
*Relaying rails, 56 to 60 lb.	19.00 to	21.00
*Relaying rails, 65 lb. and heavier	22.00 to	27.00

Per Net Ton

Rolling Mill Grades:		
Iron angle and splice bars	7.00 to	7.50
Iron arch bars and transoms	8.00 to	8.50
Iron car axles	13.50 to	14.50
Steel car axles	10.50 to	11.00
No. 1 railroad wrought	6.50 to	7.00
No. 2 railroad wrought	6.75 to	7.25
No. 1 busheling	5.00 to	5.50
No. 2 busheling	4.00 to	4.50
Locomotive tires, smooth	10.50 to	11.50
Pipes and flues	4.50 to	5.00
Cupola Grades:		
No. 1 machinery cast	8.50 to	9.00
No. 1 railroad cast	7.00 to	7.50
No. 1 agricultural cast	7.00 to	7.50
Stove plate	6.25 to	6.75
Grate bars	5.50 to	6.00
Brake shoes	5.75 to	6.25

*Relaying rails, including angle bars to match, are quoted f.o.b. dealers' yards.

PHILADELPHIA

Per gross ton delivered consumers' yards:

No. 1 heavy melting steel	$7.50 to	$8.50
No. 2 heavy melting steel		7.00
No. 1 railroad wrought	9.50 to	10.00
Bundled sheets (for steel works)		6.00
Hydraulic compressed, new	7.00 to	7.50
Hydraulic compressed, old	6.00 to	6.50
Machine shop turnings (for steel works)		5.50
Heavy axle turnings (or equiv.)	7.00 to	8.00
Cast borings (for steel works and roll. mill)	5.50 to	6.00
Heavy breakable cast (for steel works)		9.50
Railroad grate bars		7.50
Stove plate (for steel works)		7.50
No. 1 low phos., hvy. (0.04% and under)	11.00 to	12.00
Couplers and knuckles		11.00
Rolled steel wheels	10.00 to	10.50
No. 1 blast furnace		3.50
Wrot. iron and soft steel pipe and tubes (new specific.)		10.50
Shafting	15.00 to	15.50
Steel axles	15.00 to	15.50
No. 1 forge fire	7.50 to	8.00
Cast iron carwheels	11.50 to	12.00
No. 1 cast		10.50
Cast borings (for chem. plant)	11.50 to	12.00
Steel rails for rolling		10.50

CLEVELAND

Per gross ton delivered consumers' yards:

Basic Open-Hearth Grades:		
No. 1 heavy melting steel	$7.50 to	$7.75
No. 2 heavy melting steel	6.75 to	7.25
Compressed sheet steel	7.00 to	7.25
Light bundled sheet stampings	6.00 to	6.50
Drop forge flashings	6.00 to	6.25
Machine-shop turnings	4.75 to	5.25
Short shoveling turnings	5.75 to	6.25
No. 1 busheling	6.50 to	6.75
Steel axle turnings	7.50 to	8.00
Acid Open-Hearth Grades:		
Low phos. billet bloom and slab crops	14.00 to	14.50
Blast Furnace Grades:		
Cast iron borings	5.25 to	5.75
Mixed borings and short turnings	5.25 to	5.75
No. 2 busheling	5.25 to	5.75
Cupola Grades:		
No. 1 cast	9.00 to	9.50
Railroad grate bars	6.00 to	6.50
Stove plate	6.00 to	6.50
Rails under 3 ft.	15.00 to	15.50
Miscellaneous:		
Rails for rolling	13.00 to	13.50
Railroad malleable	11.00 to	11.25

BUFFALO

Per gross ton, f.o.b. Buffalo consumers' plants:

Basic Open-Hearth Grades:		
No. 1 heavy melting steel		$9.00
No. 2 heavy melting scrap	$7.50 to	8.00
Scrap rails	9.50 to	10.00
Hydraul. comp. sheets		7.50
No. 2 hydraul. comp. sheets		5.50
Hand bundled sheets		7.00
Drop forge flashings		7.50
No. 1 busheling	7.50 to	8.00
Hvy. steel axle turnings	8.00 to	8.50
Machine shop turnings	4.50 to	5.00
No. 1 railroad wrought	7.50 to	8.00
Acid Open-Hearth Grades:		
Knuckles and couplers		10.00
Coil and leaf springs		10.00
Rolled steel wheels		10.00
Low phos. billet and bloom ends	12.50 to	13.00
Electric Furnace Grades:		
Short shov. steel turnings	7.00 to	7.50
Blast Furnace Grades:		
Short mixed borings and turnings	6.00 to	6.50
Cast iron borings	6.00 to	6.50
No. 2 busheling	4.50 to	5.00
Rolling Mill Grades:		
Steel car axles		12.00
Iron axles	16.00 to	16.50
Cupola Grades:		
No. 1 machinery cast	10.00 to	10.50
Stove plate	8.25 to	8.50
Locomotive grate bars	7.00 to	7.50
Steel rails, 3 ft. and under	12.00 to	12.50
Cast iron carwheels	10.50 to	11.00
Malleable Grades:		
Industrial	10.00 to	10.50
Railroad	10.00 to	10.50
Agricultural	10.00 to	10.50
Special Grades:		
Chemical borings	9.00 to	9.50

BIRMINGHAM

Per gross ton delivered Birmingham district consumers' yards:

Heavy melting steel	$8.50 to	$9.00
Scrap steel rails	8.00 to	8.50
Short shoveling turnings	4.00 to	5.00
Cast iron borings	(No market)	
Stove plate		6.00
Steel axles		14.00
Iron axles		14.00
No. 1 railroad wrought		6.50
Rails for rolling		10.00
No. 1 cast		9.00
Tramcar wheels	10.00 to	10.25
Cast iron borings, chem.	12.00 to	12.50

ST. LOUIS

Dealers' buying prices per gross ton:

Selected heavy melting steel	$7.50 to	$8.00
No. 1 heavy melting or shoveling steel	6.75 to	7.25
No. 2 heavy melting or shoveling steel	6.50 to	7.00
No. 1 locomotive tires	8.00 to	8.50
Misc. stand-sec. rails including frogs, switches and guards, cut apart	8.25 to	8.75
Railroad springs	8.50 to	9.00
Bundled sheets	4.25 to	4.75
No. 2 railroad wrought	7.00 to	7.50
No. 1 busheling	6.00 to	6.50
Cast iron borings and shoveling turnings	4.75 to	5.25
Iron rails	7.00 to	8.00
Rails for rolling	9.50 to	10.00
Machine shop turnings	3.00 to	3.50
Heavy turnings	5.50 to	6.00
Steel car axles	10.50 to	11.00
Iron car axles	14.00 to	14.50
Wrot. iron bars and trans.	5.50 to	6.00
No. 1 railroad wrought	5.00 to	5.50
Steel rails, less than 3 ft.	10.00 to	10.50
Steel angle bars	7.00 to	7.50
Cast iron carwheels	6.50 to	7.00
No. 1 machinery cast	8.00 to	8.50
Railroad malleable	5.50 to	6.00
No. 1 railroad cast	6.25 to	6.75
Stove plate	6.50 to	7.00
Relay. rails, 60 lb. and under	16.00 to	16.50
Relay. rails, 70 lb. and over	20.00 to	21.00
Agricult. malleable	5.00 to	5.50

NEW YORK

Dealers' buying prices per gross ton:

No. 1 heavy melting steel	$4.50 to	$5.50
Heavy melting steel (yard)	2.75 to	3.00
No. 1 hvy. breakable cast	5.50 to	6.00
Stove plate (steel works)		3.50
Locomotive grate bars		3.50
Machine shop turnings		2.00
Short shoveling turnings		2.00
Cast borings (blast fur. or steel works)		2.50
Mixed borings and turnings		2.00
Steel car axles	11.00 to	11.50
Iron car axles (nom.)	14.00 to	14.50
Iron and steel pipe (1 in. dia., not under 2 ft. long)		5.50
Forge fire	3.25 to	3.75
No. 1 railroad wrought	5.00 to	5.25
No. 1 yard wrought, long	4.00 to	4.25
Rails for rolling	6.00 to	6.25
Stove plate (foundry)	4.75 to	5.50
Malleable cast (railroad)	6.00 to	6.50
Cast borings (chemical)	8.00 to	8.50
Per gross ton, delivered local foundries:		
No. 1 machinery cast		$8.50
No. 1 hvy. cast (columns, bldg. materials, etc.; cupola size)		6.50
No. 2 cast (radiators, cast boilers, etc.)		5.50

BOSTON

Dealers' buying prices per gross ton:

No. 1 heavy melting steel	$3.80 to	$4.60
Scrap T rails	4.10 to	4.60
Scrap girder rails	3.10 to	3.60
No. 1 railroad wrought	4.50 to	5.00
Machine shop turnings	1.25 to	2.10
Cast iron borings (steel works and rolling mill)	1.50 to	1.75
Bundled skeleton, long	3.00 to	3.25
Forge flashings	3.00 to	3.50
Blast furnace borings and turnings	1.25 to	1.30
Forged scrap	2.00 to	2.50
Shafting	10.00 to	10.50
Steel car axles	11.00 to	12.00
Wrought pipe, 1 in. in diameter (over 2 ft. long)	4.00 to	4.25
Rails for rolling	8.50 to	9.00
Cast iron borings, chemical	7.00 to	7.25
No. 2 cast	4.85 to	5.00
Per gross ton delivered consumers' yards:		
Textile cast	$9.50 to	$10.00
No. 1 machinery cast	9.50 to	10.00
Stove plate	5.00 to	5.25
Railroad malleable	10.50 to	11.00

CINCINNATI

Dealers' buying prices per gross ton:

Heavy melting steel	$6.75 to	$7.25
Scrap rails for melting	8.50 to	9.00
Loose sheet clippings	3.50 to	4.00
Bundled sheets	5.50 to	6.00
Cast iron borings	3.25 to	3.75
Machine shop turnings	4.00 to	4.50
No. 1 busheling	5.00 to	5.50
No. 2 busheling	3.25 to	3.75
Rails for rolling	9.00 to	9.50
No. 1 locomotive tires	8.50 to	9.00
No. 2 railroad wrought	6.75 to	7.25
Short rails	11.75 to	12.25
Cast iron carwheels	8.25 to	8.75
No. 1 machinery cast	10.00 to	10.50
No. 1 railroad cast	8.75 to	9.25
Burnt cast	4.25 to	4.75
Stove plate	4.25 to	4.75
Brake shoes	4.25 to	4.75
Agricultural malleable	8.00 to	8.50
Railroad malleable	9.00 to	9.50

DETROIT

Dealers' buying prices per gross ton:

Hvy. melting and shov. steel	$6.00 to	$6.50
Borings and short turnings	4.50 to	5.00
Long turnings	4.00 to	4.50
No. 1 machinery cast	8.50 to	9.00
Automotive cast	11.00 to	11.50
Hydraul. comp. sheets	5.75 to	6.25
Stove plate	5.00 to	5.50
New No. 1 busheling	5.00 to	5.50
Old No. 2 busheling	3.25 to	3.75
Sheet clippings	3.50 to	4.00
Flashings	5.25 to	5.75

CANADA

Dealers buying prices per gross ton:

	Toronto	Montreal
Heavy melting steel	$7.00	$6.00
Rails, scrap	7.00	6.00
No. 1 wrought	6.00	8.00
Machine shop turnings	2.00	2.00
Boiler plate	5.00	4.50
Heavy axle turnings	2.50	2.50
Cast borings	2.00	2.00
Steel borings	2.00	2.00
Wrought pipe	2.00	2.00
Steel axles	7.00	9.00
Axles, wrought iron	7.00	11.00
No. 1 machinery cast	....	10.00
Stove plate	....	8.00
Standard carwheels	....	8.50
Malleable	....	8.00
Per Net Ton		
No. 1 machinery cast	11.00	....
Stove plate	9.00	....
Standard carwheels	10.00	....
Malleable scrap	9.00	....

Warehouse Prices for Iron and Steel Products

CHICAGO

	Base per Lb.
Plates and structural shapes	3.00c.
Soft steel bars	2.75c.
Reinforcing bars, billet steel	1.50c. to 1.80c.
Rail steel reinforcement—	
For buildings	1.30c. to 1.40c.
Highway slabs	1.40c.
For bridges and culverts	1.50c.
Cold-fin. steel bars and shafting—	
Rounds and hexagons	3.10c.
Flats and squares	3.60c.
Bands, 7/8 in. (in Nos. 10 and 12 gages)	2.95c.
Hoops (No. 14 gage and lighter)	3.50c.
Hot-rolled annealed sheets (No. 24)	3.55c.
Galv. sheets (No. 24)	4.10c.
Hot-rolled sheets (No. 10)	3.20c.
Spikes (7/8 in. and larger)	3.45c.
Track bolts	4.30c.
Rivets, structural	4.00c.
Rivets, boiler	4.00c.

	Per Cent Off List
Machine bolts	73
Carriage bolts	73
Coach and lag screws	73
Hot-pressed nuts, sq., tap. or blank	73
Hot-pressed nuts, hex., tap. or blank	73
No. 8 black ann'l'd wire, per 100 lb.	$3.45
Com. wire nails, base per keg	2.30
Cement c't'd nails, base per keg	2.30

CLEVELAND

	Base per Lb.
Plates and struc. shapes	2.95c.
Soft steel bars	2.75c.
Reinforc. steel bars	1.75c. to 1.95c.
Cold-fin. rounds and hex	3.10c.
Cold-fin. flats and sq.	3.60c.
Hoops and bands, No. 12 to 7/8 in., inclusive	3.00c.
Hoops and bands, No. 13 and lighter	3.55c.
Cold-finished strip	*5.55c.
Hot-rolled annealed sheets (No. 24)	3.60c.
Galvanized sheets (No. 24)	4.00c.
Hot-rolled sheets (No. 10)	3.00c.
No. 9 ann'l'd wire, per 100 lb	$2.25
No. 9 galv. wire, per 100 lb	2.70
Com. wire nails, base per keg	2.25

*Net base, including boxing and cutting to length.

CINCINNATI

	Base per Lb.
Plates and struc. shapes	3.25c.
Bars, soft steel or iron	3.00c.
New billet reinforc. bars	3.00c.
Rail steel reinforc. bars	3.00c.
Hoops	3.90c.
Bands	3.20c.
Cold-fin. rounds and hex	3.50c.
Squares	4.00c.
Hot-rolled annealed sheets (No. 24)	3.75c.
Galv. sheets (No. 24)	4.25c.
Hot-rolled sheets (No. 10)	3.30c.
Structural rivets	4.20c.
Small rivets	60 per cent off list
No. 9 ann'l'd wire, per 100 lb.	$3.00
Com. wire nails, base per keg (10 to 49 kegs	2.65
Larger quantities	2.50
Cement c't'd nails, base 100-lb. keg	2.95
Chain, per 100 lb.	10.25

	Net per 100 Ft.
Seamless steel boiler tubes, 2-in.	$17.50
4-in.	36.00
Lap-welded steel boiler tubes, 2-in.	16.50
4-in.	34.50

BUFFALO

	Base per Lb.
Plates and struc. shapes	3.25c.
Soft steel bars	3.00c.
Reinforcing bars	2.65c.
Cold-fin. flats and sq.	3.65c.
Rounds and hex.	3.15c.
Cold-rolled strip steel	5.25c.
Hot-rolled annealed sheets (No. 24)	3.70c.
Galv. sheets (No. 24)	4.10c.
Bands	3.35c.
Hoops	3.90c.
Hot-rolled sheets (No. 10)	3.50c.
Com. wire nails, base per keg	$2.45
Black wire, base per 100 lb.	3.20

NEW YORK

	Base per Lb.
Plates and struc. shapes	2.70c. to 3.10c.
Soft steel bars, small shapes	2.70c. to 3.10c.
Iron bars	3.24c.
Iron bars, Swed. charcoal	7.00c. to 7.25c.
Cold-fin. shafting and screw stock:	
Rounds and hexagons	3.40c.
Flats and squares	3.90c
Cold-roll. strip, soft and quarter hard	4.95c.
Hoops	3.75c.
Bands	3.40c.
Hot-rolled sheets (No. 10)	3.00c. to 3.25c.
Hot-rolled ann'l'd sheets (No. 24*)	3.60c.
Galvanized sheets (No. 24*)	4.00c.
Long terne sheets (No. 24)	5.00c.
Standard tool steel	12.00c.
Wire, black annealed	4.50c.
Wire, galv. annealed	5.15c.
Tire steel, 1/2 x 1/2 in. and larger	3.40c.
Smooth finish, 1 to 2 1/2 x 1/4 in. and larger	3.75c.
Open-hearth spring steel, bases,	4.50c. to 7.00c.

*No. 28 and lighter, 36 in. wide, 20c. higher per 100 lb.

	Per Cent Off List
Machine bolts, cut thread:	
3/4 x 6 in. and smaller	65 to 65 and 10
1 x 30 in. and smaller	65 to 65 and 10
Carriage bolts, cut thread:	
1/2 x 6 in. and smaller	65 to 65 and 10
3/4 x 20 in. and smaller	65 to 65 and 10

Boiler Tubes:	Per 100 Ft.
Lap welded, 2-in.	$19.00
Seamless steel, 2-in.	20.25
Charcoal iron, 2-in.	26.25
Charcoal iron, 4-in.	67.00

ST. LOUIS

	Base per Lb.
Plates and struc. shapes	3.25c.
Bars, soft steel or iron	3.00c.
Cold-fin. rounds, shafting, screw stock	3.35c.
Hot-rolled annealed sheets (No. 24)	3.80c.
Galv. sheets (No. 24)	4.35c.
Hot-rolled sheets (No. 10)	3.45c.
Black corrug. sheets (No. 24)	3.85c.
Galv. corrug. sheets	4.40c.
Structural rivets	4.00c.
Boiler rivets	4.00c.

	Per Cent Off List
Tank rivets, 7/8-in. and smaller, 100 lb. or more	65
Less than 100 lb.	60
Machine bolts	73
Carriage bolts	73
Lag screws	73
Hot-pressed nuts, sq., blank or tapped, 200 lb. or more	73
Less than 200 lb.	63
Hot-pressed nuts, hex., blank or tapped, 200 lb. or more	73
Less than 200 lb.	63

PACIFIC COAST

(Less than 5000 Lb.)

	Base per Lb. San Francisco	Los Angeles	Seattle
Plates and struc. shapes, 1/4-in. and heavier	2.80c.	3.00c.	2.25c.
Soft steel bars	2.80c.	3.00c.	2.25c.
Reinforcing bars	2.80c.	2.80c.	3.00c.
Hot-rolled annealed sheets (No. 24)	3.90c.	4.00c.	3.50c.
Hot-rolled sheets (No. 10)	3.40c.	3.50c.	3.00c.
Galv. sheets (No. 24)	4.40c.	4.20c.	4.00c.
Struc. rivets, 1/2 in. and larger, less than 1000 lb.	5.00c.	5.00c.	5.50c.
Special nails: common 4 to 60d; smooth box 4 to 20d; finish 6 and 8 d: base per keg	$2.55	$2.45	$2.40
Other wire nails, base per keg	2.80	2.70	2.65
Cement c't'd nails, 100-lb. keg	2.65	2.70	2.65

PITTSBURGH

	*Base per Lb.
Plates	2.85c.
Structural shapes	2.85c.
Soft steel bars and small shapes	2.60c.
Reinforcing steel bars	2.60c.
Cold-finished and screw stock—	
Rounds and hexagons	3.10c.
Squares and flats	3.60c.
Bands	2.95c.
Hoops	3.60c.
Hot-rolled annealed sheets (No. 24), 25 or more bundles	3.05c.
Galv. sheets (No. 24), 25 or more bundles	3.65c.
Hot-rolled sheets (No. 10)	3.15c. to 3.20c.
Galv. corrug. sheets (No. 28), per square (less than 3750 lb.)	3.74c.
Spikes, large	2.50c.
Small	2.75c. to 2.90c.
Boat	3.00c.
Track bolts, all sizes, per 100 count,	73 and 10 per cent off list
Machine bolts, 100 count,	73 and 10 per cent off list
Carriage bolts, 100 count,	73 and 10 per cent off list
Nuts, all styles, 100 count,	73 and 10 per cent off list
Large rivets, base per 100 lb.	$3.00
Wire, black, soft ann'l'd, base per 100 lb.	2.30
Wire, galv. soft, base per 100 lb.	2.75
Common wire nails, per keg	$2.05 to 2.15
Cement coated nails, per keg	2.05 to 2.15

*On plates, structurals, bars, reinforcing bars, bands, hoops and blue annealed sheets, base applied to orders of 400 to 999 lb.

PHILADELPHIA

	Base per Lb.
Plates, 1/4-in. and heavier	2.50c.
Structural shapes	2.50c.
Soft steel bars, small shapes, iron bars (except bands)	2.60c.
Reinforc. steel bars, sq., twisted and deform.	2.30c.
Cold-fin. steel, rounds and hex.	3.40c.
Cold-fin. steel, sq. and flats	3.90c.
Steel hoops	3.15c.
Steel bands, No. 12 to 7/8-in., inclu.	2.90c.
Spring steel	5.00c.
Hot-rolled box annealed sheets (No. 24)	3.55c.
Galvanized sheets (No. 24)	4.00c.
Hot rolled blue annealed sheets (No. 10)	3.05c.
Diam. pat. floor plates, 1/4-in.	5.20c.
Swedish iron bars	6.60c.

These prices are subject to quantity differentials except on reinforcing and Swedish iron bars.

BOSTON

	Base per Lb.
Plates	*3.35c.
Structural shapes—	
Angles and beams	*3.35c.
Tees	*3.35c.
Zees	*3.35c.
Soft steel bars, small shapes	*3.25c.
Reinforcing bars	3.10c. to 3.25c.
Iron bars—	
Refined	3.25c.
Best refined	4.60c.
Norway rounds	6.60c.
Norway squares and flats	7.10c.
Spring steel—	
Open-hearth	5.00c.
Crucible	12.00c.
Tire steel	4.50c. to 4.75c.
Bands	*3.75c. to 4.25c.
Hoop steel	4.90c. to 5.40c.
Cold-rolled steel—	
Rounds and hex.	3.50c. to 5.50c.
Squares and flats	4.00c. to 6.00c.
Toe calk steel	6.00c.
Rivets, structural or boiler	4.80c.

	Per Cent Off List
Machine bolts	65 and 5
Carriage bolts	65 and 5
Lag screws	65 and 5
Hot-pressed nuts	40 and 10
Cold-punched nuts	40 and 10
Stove bolts	70 and 10

*Base price (250 to 999 lb.); less than 250 lb., add 50c. per 100 lb.; 1000 to 7999 lb., deduct 15c.; 8000 to 14,999 lb., deduct 25c.; 15,000 lb. and larger lots, deduct 35c.

Fabricated Structural Steel

NEW fabricated structural steel projects of 32,000 tons are the largest since the third week in September, and compare with only 5500 tons a week ago. Included are a Post Office in Cleveland requiring 10,000 tons, a Post Office and Court House in Pittsburgh, 7000 to 12,000 tons, and an approach to a State highway bridge in Peoria, Ill., 2000 tons.

Awards totaling 17,000 tons compare with 20,000 tons a week ago and 9000 tons two weeks ago. The only sizable contracts are 2400 tons for a State highway bridge in Massachusetts, 1500 tons for a bridge in West Philadelphia and 1000 tons for a building at the Chicago World's Fair. Awards follow:

NORTH ATLANTIC STATES

Erving-Gill, Mass., 2400 tons, State bridge, to McClintic-Marshall Corpn.

Worcester, Mass., 1500 tons, war memorial building, to Eastern Bridge & Structural Co.

Pawtucket, R. I., 450 tons, post office, to Bethlehem Fabricators, Inc.

Framingham-Natick, Mass., 420 tons, State bridges, to an unnamed fabricator.

Newark, N. J., 355 tons, Second Presbyterian Church, to Goeller Steel Construction Co., New York.

New York, 215 tons, Ethical Culture School at Fieldston, to Ingalls Iron Works.

Troy, N. Y., 305 tons, chapel for Sisters of St. Joseph, to Leach Steel Corpn., Buffalo.

New York, 900 tons, Y. M. C. A. building at 135th Street, to George A. Just Co.

New York, 950 tons, public school 85, to Harris Structural Steel Co.

Whitestone, N. Y., 500 tons, public school 79, to Harris Structural Steel Co.

Brooklyn, 300 tons, St. Vincent Ferrar's School, to George A. Just Co.; Frank Droesch, Inc., general contractor.

Canarsie, N. Y., public school 242, to Easton Structural Steel Co.

Chester, Pa., 500 tons, addition to plant of Ford Motor Co. to Morris Wheeler Co.

Philadelphia, 1500 tons, bridge in West Philadelphia, placed by Canuso & Son with Fort Pitt Bridge Works.

Washington, 100 tons, garage for Department of Sewers, to Virginia Bridge & Iron Works.

THE SOUTH

Charlotte, N. C., 105 tons, extension to Hudson Silk Hosiery Co. plant, to Southern Engineering Co.

St. Bernard's Parish, La., 148 tons, highway bridge, to Vincennes Bridge Co.

CENTRAL STATES

Pere Marquette Railway, 230 tons, bridge, to Mount Vernon Bridge Co.

Ionia, Mich., 370 tons, State highway bridge, to Fort Pitt Bridge Works Co.

Ypsilanti, Mich., 410 tons, Ford Motor Co. plant to Whitehead & Kales Co.

Eloise, Mich., 300 tons, hospital addition, to an unnamed bidder.

State of Indiana, 495 tons, highway bridges, to R. C. Mahon Co.

Sheboygan, Wis., 100 tons, bridge work, to Worden-Allen Co.

LaCrosse, Wis., 150 tons, grade separation, to Worden-Allen Co.

State of Minnesota, 110 tons, highway bridge to Des Moines Structural Steel Co.

Chicago, 1000 tons, World's Fair buildings, to Bates Expanded Steel Corpn., East Chicago, Ind.

Chicago, 300 tons, Chicago Motorists' Building, to American Bridge Co.

Fulton County, Ill., 160 tons, highway bridge, to Clinton Bridge Works.

St. Louis, 300 tons, angles for transmission towers for Union Electric Light & Power Co., to Missouri Rolling Mills Corpn.

WESTERN STATES

Madison County, Idaho, 140 tons, Canyon Creek highway bridge, to Minneapolis Steel & Machinery Co.

Berkeley, Cal., 100 tons, post office additions, to McClintic-Marshall Corpn.

Boulder City, Nev., 400 tons, structures at Hoover Dam, to Columbia Steel Co.

Boulder City, 600 tons, storage bins for six companies, to McClintic-Marshall Corpn.

Eugene, Ore., 250 tons, filtration plant, to an unnamed bidder.

Bakersfield, Cal., 138 tons, Kress Store, to International Stacey Corpn.

Chelan County, Wash., 700 tons, Wenatchee River highway bridge, to Puget Sound Bridge & Drydock Co.

STRUCTURAL PROJECTS PENDING

Inquiries for fabricated steel work include the following:

NORTH ATLANTIC STATES

Everett, Mass., 178 tons, Merrimac Chemical Co. acid plant.

Springfield, Mass., 300 tons, Boston & Albany Railroad bridge repairs.

State of New York, 175 tons, highway bridge in Rensselaer County.

New York, 850 tons, public school 95.

New York, 1200 tons, Columbia University library building.

New York, 450 tons, Pier 9, East River, for Department of Docks.

Brooklyn, 200 tons, six-story warehouse, 1300 Flushing Avenue.

Creedmore, N. Y., 600 tons, Brooklyn State Hospital buildings.

Pottstown, Pa., 450 tons, junior high school building.

Downingtown, Pa., 150 tons, junior and senior high school.

Dover, Del., 270 tons, State House.

Phillipsburg, N. J., 150 tons, Nurses' Home; Griffith-Custer Co., general contractor.

Meadville, Pa., 300 tons, sewage disposal plant.

Buffalo, 1080 tons, Michigan Avenue bridge; Wisconsin Bridge & Iron Co., low bidder.

Pittsburgh, 7000 to 12,000 tons, post office-court house; bids to be opened Dec. 15 by Supervising Architect, Treasury Department, Washington.

CENTRAL STATES

Rocky River, Ohio, 200 tons, sewage disposal plant.

Cleveland, 10,000 tons, post office.

Springfield, Ill., 3171 tons, 11 bridges for Illinois Highway Commission; bids opened Nov. 10.

Peoria, Ill., 2000 tons, approach to State highway bridge; bids opened Nov. 10.

Springfield, Mo., 120 tons, Veterans' Hospital.

St. Louis, 120 tons, Biddle Street market for St. Louis Board of Public Service.

WESTERN STATES

Fremont County, Idaho, 130 tons, Snake River highway bridge.

Los Angeles County, 113 tons, Alamitos Bay bridge.

Stockton, Cal., 200 tons, post office.

Martinez, Cal., 250 tons, post office.

FABRICATED PLATE

AWARDS

Rocky Hill, Conn., 100 tons, standpipe to Chicago Bridge & Iron Works.

Kansas City, Mo., 120 tons, plates for post office, to American Car & Foundry Co.

Alameda County, Cal., 7000 tons, Coral Hollow emergency water pipe line for San Francisco; 24 miles of 36 and 44-in. pipe, to Western Pipe & Steel Co., by Youdall Construction Co., general contractor.

Bay City, Mich., 400 tons, cutter for United States Coast Guard, to Defoe Boat & Motor Co.

PROJECTS PENDING

St. Louis, 1100 to 4400 tons, 10 to 40 barges for Mississippi Barge Line; bids taken Nov. 10.

Seattle, 100 or 300 tons, depending on elective specifications, Hood Reservoir pipe line.

▲ ▲ ▲

Reinforcing Steel

Boston, 280 tons, Boston Transit Commission for Governor's Square subway, to Truscon Steel Co.

Philadelphia, 500 tons, boulevard along Schuylkill River, to Kalman Steel Corpn.; Frederick Snare Corpn., New York, general contractor.

Pittsburgh, 900 tons, approaches to West End-North Side bridge, to Fort Pitt Bridge Works Co.

Cleveland, 200 tons, section 2, Nine Mile Creek, to Builders' Structural Steel Co., Cleveland.

Frankfort, Ky., 110 tons, State road construction in Kenton County, to Jones & Laughlin Steel Corpn.

Milwaukee, 300 tons, grain elevator, to Calumet Steel Co.

Elgin, Ill., 100 tons, high school, to Joseph T. Ryerson & Son, Inc.

San Luis Obispo County, Cal., 222 tons, State highway section, to Soule Steel Co.

Monterey County, Cal., 100 tons, State highway section, to Truscon Steel Co.

San Benito County, Cal., 170 tons, San Juan Creek highway bridge, to Truscon Steel Co.

Berkeley, Cal., 310 tons, State deaf and dumb school, to Soule Steel Co.

McNeil Island, Wash., 100 tons, Federal prison, to Northwest Steel Rolling Mills.

REINFORCING BARS PENDING

Inquiries for reinforcing steel bars include the following:

Ventnor, N. J., 300 tons, sewage disposal plant.

Fort Wayne, Ind., 500 tons, sewage disposal plant; Max Irmscher & Son, Fort Wayne, general contractor.

Johnson City, Tenn., 200 tons, Veterans' Hospital and barracks.

Springfield, Mo., 725 tons, Veterans' Hospital.

Beverly Hills, Cal., 200 tons, roof for reservoir.

Santa Barbara County, Cal., 172 tons, State highway section.

American Lake, Wash., 150 tons, Veterans' Hospital.

Los Angeles, 104 tons, bridge foundations at Second and Glendale Streets.

Berkeley, Cal., 362 tons, men's gymnasium at University of California.

▲ ▲ ▲

Pipe Lines

Detroit City Gas Co., 415 Clifford Street, Detroit, Charles W. Bennett, vice-president, negotiating with Columbia Gas & Electric Co., Charleston, W. Va., for natural gas supply, to be mixed with artificial gas for local distribution. Pipe line will be built to city, either from Toledo, Ohio, where Columbia system ends, or by extension of line of Panhandle Eastern Line Pipe Co., subsidiary of Columbia company. Cost over $3,000,000.

United Gas Public Service Co., Longview, Tex., authorized installation of 4-in. pipe lines from Longview to Gladewater, Tex., and vicinity, with intermediate lines for service at Willow Springs, Teneryville and Turner Town, 25 miles in all. Cost $150,000.

Old Dutch Refining Co., Mount Pleasant, Mich., considering pipe line from Mount Pleasant district to Muskegon, Mich., for crude oil supply, about 85 miles. Cost $65,000.

Silver Creek Municipal Utility District, City Hall, Sacramento, Cal., plans installation of about 60 miles of steel pipe, 36 to 45-in. diameter, in connection with mountain water supply for city. Cost $10,800,000. Bond issue is being arranged.

▲ ▲ ▲

Railroad Equipment

Alaska Railroad is inquiring for one 4-8-2 type locomotive.

Norfolk & Western will build 10 locomotive tenders and make repairs to 500 steel coal cars at its Roanoke shops.

Delaware, Lackawanna & Western is inquiring for 12 high-speed, 4-8-4, Pocono type, freight locomotives.

Western Fruit Express Co. is taking bids on 300 steel underframes.

Where Steel Exports Went in First Nine Months

Canada Took 143,177 Tons of Nine Leading Items—Philippines, in Second Position, Took 19,239 Tons, Followed by Japan, 17,278 Tons; Mexico, 15,922 Tons; Argentina, 10,601 Tons; China, 10,053 Tons

Exports from United States, by Countries of Destination

(In Gross Tons)

Steel Plates

	September		Nine Months Ended September	
	1931	1930	1931	1930
Totals	*2,523*	*5,939*	*38,004*	*82,246*
Canada	2,329	4,676	32,019	64,901
Japan	....	25	19	1,023
Cuba	39	89	130	1,403
Philippine Islands	27	320	2,456	1,245
Mexico	44	19	550	1,023
Argentina	....	....	93	....
Chile	....	....	291	....
Colombia	7	....	28	....

Galvanized Sheets

	September		Nine Months Ended September	
	1931	1930	1931	1930
Totals	*3,091*	*5,487*	*43,175*	*75,165*
Canada	174	905	3,799	16,472
Japan	25	46	415	2,038
Cuba	119	289	1,470	3,713
Philippine Islands	842	783	13,031	14,361
Mexico	111	386	3,230	3,992
Argentina	88	182	313	1,604
Chile	....	....	2,041	....
Colombia	276	203	1,588	2,140

Black Steel Sheets

	September		Nine Months Ended September	
	1931	1930	1931	1930
Totals	*6,639*	*10,339*	*70,943*	*91,685*
Canada	4,122	8,857	44,069	57,679
Japan	325	320	2,056	7,259
Cuba	18	74	194	633
Philippine Islands	....	54	778	2,537
Mexico	50	58	1,371	2,287
Argentina	422	593	4,062	3,460
Chile	....	....	1,491	....
Colombia	59	10	154	446

Steel Rails

	September		Nine Months Ended September	
	1931	1930	1931	1930
Totals	*1,576*	*6,526*	*26,179*	*87,796*
Canada	688	1,878	8,079	12,694
Japan	....	....	3,025	5,137
Cuba	....	698	598	5,301
Philippine Islands	62	2	2,674	3,671
Mexico	....	292	114	775
Argentina	68	52	806	2,150
Chile	....	....	631	27,500
Colombia	....	....	30	3,223
Brazil	....	....	1,237	4,212

Barbed Wire

	September		Nine Months Ended September	
	1931	1930	1931	1930
Totals	*1,005*	*3,567*	*19,997*	*31,897*
Canada	....	64	1,325	2,381
Japan	....	....	....	....
Cuba	68	165	1,263	2,252
Philippine Islands	....	36	792	802
Mexico	21	345	2,745	4,822
Argentina	110	549	1,368	4,042
Chile	107	....	262	....
Colombia	241	74	1,581	210
Brazil	295	....	4,586	5,084

Plain and Galvanized Wire

	September		Nine Months Ended September	
	1931	1930	1931	1930
Totals	*835*	*1,474*	*10,699*	*20,572*
Canada	103	269	1,918	5,570
Japan	28	3	191	375
Cuba	33	157	367	978
Philippine Islands	5	12	232	304
Mexico	36	80	684	1,395
Argentina	332	272	2,256	4,570
Chile	....	16	65	132
Colombia	25	....	470	....
Brazil	16	95	509	741

Tin Plate

	September		Nine Months Ended September	
	1931	1930	1931	1930
Totals	*7,239*	*21,402*	*66,063*	*180,706*
Canada	178	11,981	3,462	48,776
Japan	2,347	3,075	12,862	42,464
Cuba	83	587	1,950	3,389
Mexico	666	836	8,013	9,075
Argentina	980	1,627	4,941	10,193
Chile	6	784	1,099	4,005
Brazil	250	306	3,081	2,090
China	1,125	972	8,804	18,050
India	....	....	....	7,957
United Kingdom	....	....	....	....
Italy	....	....	....	7,513

Steel Bars

	September		Nine Months Ended September	
	1931	1930	1931	1930
Totals	*2,000*	*3,739*	*30,665*	*69,545*
Canada	511	1,736	14,170	32,398
Japan	16	4	247	2,055
Cuba	13	156	202	1,677
Mexico	13	87	182	905
Argentina	1	13	126	466
Chile	....	....	2,019	4,827
Brazil	14	66	240	582
China	125	....	1,249	....
India	....	....	58	....
United Kingdom	645	619	2,767	7,467
Italy	....	....	....	....

Plain Heavy Structural Material

	September		Nine Months Ended September	
	1931	1930	1931	1930
Totals	*9,520*	*12,128*	*78,631*	*113,520*
Canada	8,896	10,706	69,548	86,807
Japan	....	....	199	3,710
Cuba	49	38	276	2,080
Mexico	8	121	346	1,176
Argentina	5	2	105	1,427
Chile	44	....	3,051	1,695
Brazil	....	....	33	....
China	....	....	75	....
India	....	....	....	....
United Kingdom	....	....	....	....
Italy	....	....	12	....

Destination of Iron and Steel Products

(In Gross Tons)

Country	Sept., 1931	Aug., 1931	Sept., 1930	January Through September 1931	January Through September 1930
North and Central America and West Indies	*40,143*	*35,650*	*81,496*	*443,619*	*815,882*
Canada and Newfoundland	31,493	29,992	67,374	366,013	662,873
Cuba	1,030	627	3,559	12,458	35,662
Guatemala	229	238	248	2,002	2,976
Honduras	210	206	394	1,717	5,190
Mexico	4,517	2,823	5,259	38,189	68,467
Panama	1,400	695	998	10,423	14,876
British West Indies	460	232	798	3,676	10,743
Other West Indies	477	471	1,917	4,573	10,084
Other Cen. America	327	366	949	4,568	5,011
South America	*6,939*	*9,154*	*16,541*	*103,698*	*227,087*
Argentina	2,650	2,573	4,990	29,918	41,255
Brazil	816	1,214	2,950	13,950	32,916
Chile	149	1,036	2,775	22,653	65,359
Colombia	1,193	860	1,095	9,541	20,701
Peru	979	1,984	1,423	11,873	14,182
Uruguay	192	256	1,251	5,007	16,286
Venezuela	897	731	1,652	8,971	31,296
Other So. America	63	500	405	1,785	5,092
Europe	*6,175*	*7,261*	*5,858*	*58,505*	*144,204*
Belgium	202	175	88	2,425	7,392
France	497	612	281	7,530	5,054
Germany	44	1	159	951	4,510
Italy	250	1,473	543	5,914	43,455
Norway	324	364	394	2,484	6,193
Soviet Russia in Europe	43	24	264	2,236	7,901
Spain	2	10	33	145	11,069
United Kingdom	3,746	3,679	3,032	25,693	35,816
Other Europe	1,067	923	1,064	11,127	22,814
Far East	*16,317*	*19,662*	*25,568*	*173,876*	*432,123*
British Malaya	30	205	293	1,911	5,307
China	2,981	2,284	1,927	31,400	31,711
Netherlands East Indies	452	517	2,804	6,687	32,096
India and Ceylon	747	1,742	1,211	10,515	17,331
Hong Kong	534	1,026	381	6,011	4,869
Japan	8,610	10,057	11,127	67,667	256,310
Kwantung	436	238	2,571	1,213	9,401
Philippine Islands	2,369	3,165	4,333	44,109	54,607
Australia	60	243	514	1,630	8,393
New Zealand	17	128	115	689	2,778
Other Asia and Far East markets	81	57	292	2,044	9,320
Africa	*194*	*1,611*	*1,582*	*9,416*	*16,873*
Union of So. Africa	68	921	795	3,570	4,067
Egypt	77	79	180	2,139	3,665
Mozambique	16	604	406	2,310	4,192
Other Africa	33	7	201	1,397	4,949
Total	69,768	73,339	131,045	789,114	1,636,169

Continental Mills Still Curtail Output But British Sentiment Is Better

▲ ▲ ▲

(*By Cable*)

LONDON, ENGLAND, Nov. 9.

EMERGENCY restriction of imports is expected to be enacted by Parliament as a preliminary to definite tariff legislation. General sentiment is still improving and iron and steel inquiry broadening, although actual business is still limited.

Deliveries of pig iron to domestic users are increasing, and semi-finished steel orders have improved as foreign competition has diminished. Finished products, however, are quiet, despite a distinct improvement in shipbuilding in October.

The position of Continental steel mills is still unsatisfactory despite recent improvement in demand from the Far East, and as a result, production has been further curtailed. Uncertainty on the Continent is caused by exchange fluctuations, the possibility of a British tariff, and rumors of financial instability in the German steel industry.

While the gold pound sterling is being widely used by European mills in quoting for export, Belgian works are using the paper pound sterling against firm business, and the German Wire Syndicate is selling overseas in paper pounds giving buyers the option of paying in American dollars, French francs or Dutch florins at par value.

At the annual meeting of the Société Anonyme John Cockerill, Seraing, Belgium, it was stated that the business situation had been made worse by lack of progress in negotiating international agreements, and that the company has been compelled to sell steel below cost of production.

Welsh tin plate prices are advancing as low-priced foreign sheet bars are disappearing from the market, but foreign inquiry for tin plate is broadening and there have been moderate sales to Continental users and Japan. Canadian wire rods have been sold to Japan at $28 (American) c.i.f. port.

British expect early restriction of imports pending tariff legislation.

* * *

German railroads lay 90-meter rails, composed of three lengths welded together.

* * *

Canadian wire rods sold to Japan $28 (American), c.i.f. port.

▼ ▼ ▼

▲ ▲ ▲

British Machinery Trade Rapidly Improving

WASHINGTON, Nov. 10.—Encouraging conditions are reported in various branches of the British machinery industry, says a report to the Department of Commerce from London. Machine tool manufacturers are well employed, compared with recent months, and demand for internal-combustion engines, air compressors and other lines of auxiliary machinery is well maintained. A comparatively large amount of business is being received from abroad by textile machinery manufacturers.

▲ ▲ ▲

German Railroads Adopt 90-Meter Rails

HAMBURG, GERMANY, Oct. 28.—The German railroad administration is continuing its investigation of long rail lengths and states that it has found the importance of spacing at the end of rails to have been overestimated. Lengths of 60 meters, composed of two 30-meter rails welded together, are now being widely used, and recently 90-meter sections, composed of three 30-meter rails welded together, have been introduced successfully. The railroads are using the alumino-thermic welding process of the Theodore Goldschmidt A. G., Essen.

▲ ▲ ▲

Japanese Steel Works Plans Sheet Mill

YOKOHAMA, JAPAN, Oct. 3.—The Azuma Steel Works is planning to manufacture black sheets. A site for the mill has been selected, and the company is inquiring for rolling equipment for a capacity of about 2000 tons a month. Construction of the mill may be delayed by the recent report that the Nakayama Sheet Steel Works is planning to expand its capacity.

▲ ▲ ▲

Continental Tin Plate Demand Increases

BERLIN, GERMANY, Oct. 28.—Although Welsh tin plate has been imported recently by German consumers because of advantageous prices, the German tin plate producers expect to resume operations soon. There is a heavy demand on the Continent for canned foodstuffs, and packers have been placing substantial orders.

British and Continental European Export Prices f.o.b. United Kingdom Ports, Hamburg and Antwerp

British Prices, f.o.b. United Kingdom Ports

Per Gross Ton, £ at $3.96

Ferromanganese, export	£9	0s.				$35.64		
Billets, open-hearth	5	7½	to	£5	12½s.	21.23	to	$22.19
Black sheets, Japanese specifications	9	15	to	10	0	38.61	to	39.60
Tin plate, per base box	0	14	to	0	14¼	2.77	to	2.82
						Cents a Lb.		
Steel bars, open-hearth	7	17½	to	8	7½	1.39	to	1.48
Beams, open-hearth	7	7½	to	7	17½	1.30	to	1.39
Channels, open-hearth	7	12½	to	8	2½	1.34	to	1.43
Angles, open-hearth	7	7½	to	7	17½	1.30	to	1.39
Black sheets, No. 24 gage	8	5	to	8	10	1.46	to	1.50
Galvanized sheets, No. 24 gage	9	7½				1.65		

Continental Prices, f.ob. Antwerp or Hamburg

Per Metric Ton, Gold £ at $4.86

Billets, Thomas	£2	15s.	to	£2	16s.	$13.36	to	$13.61
Wire rods, No. 5 B.W.G.	5	5				25.51		
Black sheets, No. 31 gage, Japanese	11	5				54.68		
						Cents a Lb.		
Steel bars, merchant	3	0	to	3	1	0.66	to	0.67
Beams, Thomas	3	1	to	3	1½	0.66	to	0.67
Angles, Thomas, 4-in. and larger	3	1	to	3	1½	0.66	to	0.67
Hoops and strip steel over 6-in. base	3	17½				0.86		
Wire, plain, No. 8	5	0	to	5	1¼	1.09	to	1.10
Wire, barbed, 4-pt., No. 10, B.W.G.	8	10				1.87		

Defines "Stainless" for Use as Cutlery Label

WASHINGTON, Nov. 10.—Use of the label "stainless" is not permissible on cutlery, according to a Federal Trade Commission order to the Globe Supply Co., New York, unless the steel contains as standard constituents from 9 to 16 per cent chromium and not more than 0.70 per cent carbon.

▲ ▲ ▲

Testing Coatings for Water Tank Interiors

Pittsburgh-Des Moines Steel Co., Pittsburgh, manufacturer of water tanks and towers, in conjunction with the borough of Ambridge, Pa., is conducting an extensive test in a 1,000,000-gal. water tank at Ambridge of the various paints and compounds suitable for coating inside surfaces of steel tanks for storing water for domestic use.

The inside of the tank shell and bottom has been divided into 196 vertical strips, each strip being painted with a different compound or coating material. The tank will be filled with water and placed in service, and then will be emptied at periodic intervals for inspection and rating of the various paint panels.

Among the paint materials used are lead and oil, asphalt, coal tar, aluminum and other metallic paints, paints made of bakelite, rubber and other special materials.

▲ ▲ ▲

1931 Book of A. S. T. M. Tentative Standards

The 1931 Book of Tentative Standards of the American Society for Testing Materials contains 180 tentative specifications, methods of test, definitions of terms and recommended practices in effect at the time of publication. The term "tentative" applies to a proposed standard published for one or more years, with a view of eliciting criticism, before it is formally adopted as standard by the society. In the 1931 book, 44 of the tentative standards relate to metals and 136 to non-metallic materials and products. Although these tentative standards are in the trial stage of A. S. T. M. procedure, they represent the latest thoughts of the committees on these specific subjects, and therefore are being applied in many industries. Many of the tentative standards are frequently used in conjunction with the A. S. T. M. standards.

The 42 new tentative standards which have been developed this year are published in the 1931 book. In the ferrous metals group are specifications for structural steel for ships; heat - treated carbon - steel helical springs, carbon-steel forgings and normalized and tempered alloy-steel forgings for locomotives; various types of steel pipe, including electric-fusion - welded, electric - resistance-welded, forge - welded and lock - bar steel pipe. There is also a tentative specification for riveted steel and wrought-iron pipe. Specifications involving non-ferrous metals include magnesium-base alloy castings, copper-base alloys in ingot form for sand castings, aluminum-base and zinc-base alloy die castings.

Copies of the book may be obtained from headquarters of the society, 1315 Spruce Street, Philadelphia. Prices are: Paper binding, $7; cloth binding, $8.

▲ ▲ ▲

Mo-Mn Steels Low in Temper-Brittleness

Comparatively cheap steels which approximate in properties the far more costly alloy steels at present in use, is the subject of interesting research work being carried out at the research department of the British Government Arsenal, Woolwich, England.

A recent communication from the department deals with the effect of a small amount of molybdenum on the medium carbon steels containing from 1 to 2.5 per cent of manganese. It is concluded that the addition of up to 0.3 per cent of molybdenum exercises little effect on steels with 1.3 per cent of manganese in the normal condition, any slight improvement being more cheaply obtained by increasing the manganese content.

In the hardened and tempered state, however, from 0.15-0.25 per cent of molybdenum reduces the tendency to temper-brittleness, which characterizes the plain high manganese steels, and causes more uniform hardening throughout the thickness of the section. A steel with about 0.3 per cent of carbon, 2.3 per cent of manganese and 0.5 per cent of molybdenum is essentially free from temper-brittleness, and has, when in the oil-hardened and tempered condition, mechanical properties approximating to those of the far more costly nickel-chromium-molybdenum steels.

▲ ▲ ▲

The annual meeting of the Ohio Foundries Association will be held at the Deshler-Wallick Hotel, Columbus, Nov. 19. Fred G. Bennett, Buckeye Steel Casting Co., Columbus, chairman of the association's foundry code committee, will speak on various phases of the State's new foundry code, and E. I. Evans, actuary for the Ohio Industrial Commission, will speak on "Employer's Control of Workmen's Compensation Rates." The State association is sponsoring a campaign to bring about a reduction in number and severity of accidents and secure reduction in rates.

Soil-Corrosion Studied by Bureau of Standards

The Bureau of Standards is attempting not only to determine the corrosiveness of soils with respect to iron and steel but also to secure data on ways in which corrosion losses may be reduced, according to Director George K. Burgess. One of these ways is by the use of less corrodible material and another is by coating the steel with a material less susceptible to soil action. Both of these methods are being studied. Among the materials which have recently been examined, after exposure to several soils for from four to six years, are three varieties of copper, two kinds of lead, and six varieties of brass.

Small Differences Difficult to Detect

Data obtained since the tests were started indicate that on account of the unavoidable variations in soils and materials and the relatively few specimens of each material in a single soil, it will not be possible to distinguish small differences in the performances of the materials under test. Thus, all of four compositions of brass varying in copper content from 95 per cent to 75 per cent appear to perform similarly in the same soil. The data show little difference between the performances of galvanized open-hearth iron, galvanized Bessemer steel, and galvanized steel containing 0.2 per cent of copper. While small differences may exist it appears probable that the precision of the data does not warrant these differences being considered as significant.

Copper pipe and copper alloy pipe high in copper appear to resist corrosion well in nearly all soils under consideration. Muntz metal shows indications of more or less dezincification in about half of the soils in which it was buried. The lead specimens resisted corrosion well in most soils, but showed serious pitting in a few.

Lead Coating Added to Life of Pipe

There was less evidence of accelerated corrosion at points where the lead coating was punctured than was expected and, although the lead coating failed in a number of soils, it appears to have added considerable to the life of the pipe to which it was applied. The failures of this coating appear to be largely the result of corrosion of the lead rather than of pinholes in the coating.

Galvanizing appears to retard corrosion materially in many soils. Very few of the galvanized pipes showed any signs of rust after six years' exposure to soils, and at present it is not possible to determine how long the galvanized pipe will last. The complete report on this investigation appears in the September number of the Bureau of Standards *Journal of Research*.

Forming Brake Drums

(*Concluded from page* 1229)

is raised and a motor-driven pusher, operated through a link and crosshead, pushes the loaded pipes along the rails and delivers the stack to the furnace. This stacking and delivery finally fill the furnace and the first stack entering the furnace is eventually at the delivery end fully heated. The press operator withdraws the hot blanks for the press operation and returns the spacers and pipes to the charging end of the furnace for re-use in loading.

This furnace is equipped with a recording pyrometer which also operates three lights, red, green and white. These lights switch on and off automatically and the pyrometer operates them within 10 degrees, plus or minus, of the temperature set upon it. The burning of the red or green light indicates to the operator too high or too low a flow of combustible mixture, while the white light indicates that the correct temperature is being maintained.

▲ ▲ ▲

Output Regularized

(*Concluded from page* 1227)

which is sent to production department. The parts are not binned, but are held in their respective containers until requisitioned for assembly. To bin them would necessitate needless handling, since they are usually sent out again the same or the following day.

As the reports come in, showing the various jobs completed, the control sheet is posted as previously explained. When all parts on a job are finished and available for assembly, the quantity of chain which can be made is determined from the parts perpetual inventory record, and the assembly requisitions and follower tags are then issued. Incidentally, the quantities shown on the follower tags have previously been posted. Assembly work is scheduled in the same manner as parts; following final inspection, the finished product is delivered to the shipping room. The quantities received are noted on the tracer tags and forwarded to the production department.

Generally, the quantities actually delivered coincide with the amounts originally planned, yet small fluctuations occur on account of the variation in rejected work incident to all manufacture. Since the parts are being built for stock, however, instead of on direct order, small rejections exceeding standard allowances are not immediately replaced. A running balance of the cumulative difference between the quantities scheduled and delivered is kept on each assembly model and the discrepancies taken care of on the next run.

▲ ▲ ▲

Machining Saddle Castings

(*Concluded from page* 1233)

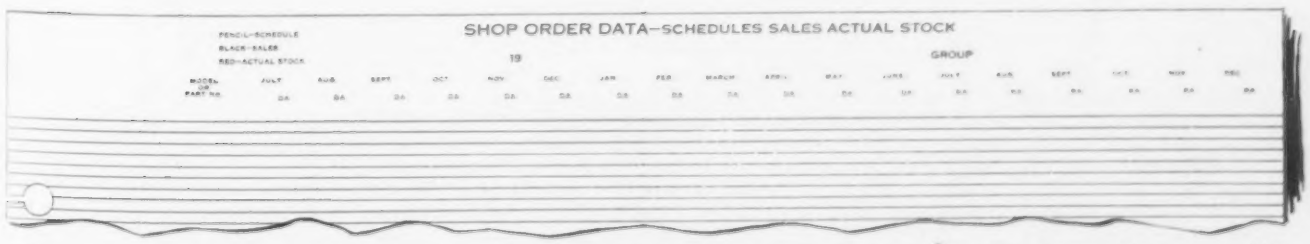
ried along this rack, it cut the concentric grooves as required.

Roughing cuts were made by means of a milling head with inserted teeth of high-speed steel. The finishing cut in each groove was made with a rose mill made of high-speed steel of the company's own manufacture.

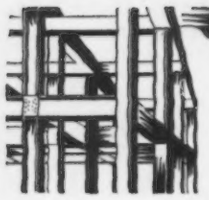
In setting up the assembled castings for milling, the base of the work was leveled to a true vertical and the center through the cable groove was alined to be accurately horizontal. Everything was related then to the vertical and horizontal lines thus established. The central groove on the axis of the saddle was the first one to be finished. This was completed with a 4-in. diameter to the groove itself, with a 1½-in. radius between that groove and the next on either side, and with a radius of 1½ in. worked over each end of the groove, to avoid a sharp edge at the points where the cable leaves the saddle. Templates were used for these grooves, carrying up over the rounded contours between grooves. The same template was used over and over as the successive grooves were machined.

After the five grooves were made to take the under side of the cable, the five grooves in the upper sloping portion and the five in the lower sloping portion, forming the two other sides of the lower half of the cable hexagon, were milled. This involved the use of the same tools and the same templates as before, except that a special template was required for the corner grooves, where the horizontal run changed to the angular run on the other side of the hexagon.

Passing inspection, the successive saddles were covered with slush as protection against oxidation. About two days before shipment they were loaded upon open cars in a designated order so that, upon arrival at the bridge site, they might be hoisted into place one after the other in the desired sequence. Each train load was shipped out upon receipt of telegraphic instructions specifying the hour, thus obviating necessity for holding the castings at the site of the bridge, where, indeed, there was no adequate storage room for them. Hence, each car was pushed upon a barge or float as soon as the train arrived, was transported to the base of the bridge tower, and its load removed at once by the crane at the top of the tower.



Shop order data sheet is used in arriving at production schedules. All models within a group are arranged on a sheet and space between heavy blue horizontal lines carries pertinent data in connection with each model. For each model the first light blue line shows schedule, second shows sales and third the actual inventory at end of month.



PLANT EXPANSION AND EQUIPMENT BUYING

Studebaker Corpn. Places Large Machine Tool Order

Equipment Purchased for New Rockne Car—Total Purchases Will Amount to About $500,000

MACHINE tool business has shown a little spotty improvement the past week. The outstanding order was placed by the Studebaker Corpn., South Bend, Ind., for equipment for machining engine blocks for the new Rockne automobile. This order amounted to about $200,000, but other orders to follow will bring the total outlay for new shop equipment to about $500,000.

Improvement in sentiment among manufacturing companies is believed to be the forerunner of a pick-up in machine tool buying. Not much gain is looked for this year, but, if the present moderate upward trend in some lines denotes the beginning of general business recovery, the machine tool industry believes that its orders will turn upward early in the new year.

A significant thing is that a few orders have been placed for which requisitions had been signed weeks ago, but the mailing of the formal orders had been delayed until some signs of business betterment were in sight. Many manufacturers have decided upon replacement equipment, but do not want to spend the money until fairly certain that their own businesses are showing an upturn.

The Milwaukee Board of Education will take bids up to Nov. 18 on a fairly large list of metal-working tools.

▲▲▲

New York

Machine tool sellers are picking up some scattered orders, but the total volume is showing no marked improvement. The Lycoming Mfg. Co., Williamsport, Pa., has placed most of the tools for which it recently inquired, but a few orders are still to be given out. The general opinion in the trade is that not much change in the situation is to be expected until early next year, unless general business recovery comes more quickly than is now indicated.

Chicago

The Studebaker Corpn., South Bend, Ind., has placed an order with a Rockford, Ill., maker for about $200,000 worth of machine tool equipment for machining engine blocks for the new Rockne automobile. Orders for about $300,000 worth of other machine tools are soon to be given out. Otherwise, the market is dull, although a few old propositions are being revived. A fair amount of replacement business is coming out.

Cleveland

A better feeling prevails in the machinery market, although orders and inquiries the past week were light. The trade expects that the keen competition that will develop on the revival of general business will force many manufacturers in metal-working lines to replace present equipment with more efficient machinery. This will bring considerable used machinery on the market, and used tools that are good but not up to date are bringing rather low prices at present. The War Department has rejected bids for some of the machinery for the Air Corps, Wright Field, Dayton, and is expected to issue new specifications for a number of machines. Tool and die work continues to come from the motor car industry and a number of plants in that field are quite busy.

Pittsburgh

The improved sentiment in the machinery trade, noticeable in the last week, has been further justified by increased inquiry, although actual buying has not gained. Representatives of local machine tool distributers are finding customers much more interested in improvement than they were earlier in the year and, while not much buying is expected before the first of the year, promises seem much more definite.

Builders of heavy machinery and equipment are still moderately busy and report a better run of small inquiry. Outstandingly large projects are lacking, although reports are constantly in circulation that certain companies are planning important betterment and expansion programs. Demand for cranes is dull.

Milwaukee

Improvement in sentiment is the order of the day in machine-tool circles. The volume of business, while expanding but negligibly so far, gives promise of making some headway this month and next, while tool builders and dealers alike look for a substantial increase in orders after the first of the year. These hopes are based on a steadily growing inquiry, especially from the automotive industries. The Milwaukee Board of School Directors is closing Nov. 18 on a sizable list of metal-working tools. A slight rise is noticeable in the employment situation, particularly as it regards foundries and machine shops in this locality.

Cincinnati

Fresh bookings of machine tool manufacturers continue spotty. General sentiment among manufacturers, however, has improved, but definite gains in demand are not anticipated until after the holidays. Plants are operating at about 30 per cent of capacity.

An Eastern manufacturer purchased two special lathes from a local builder. Other orders were for single small machines.

New England

Middlesex County Commissioner, East Cambridge, Mass., closed bids Nov. 10 on a lathe, planer, band saws and other machine shop equipment. New England machine tool builders report a slight improvement in inquiries and further correspon-

The Simonds Saw
WORKS
FITCHBURG, MASS. CHICAGO, ILL.
RED STREAK
BRANCH HOUSES
NEW YORK, NEW ORLEANS, PORTLAND, OREGON
SEATTLE, WASH., SAN FRANCISCO, CAL.
LONDON, ENGLAND.
HERE'S A SAW
THAT CUTS METAL
FASTER
Because tests and accurate checking have proved it to be so much more efficient, even on the hardest kind of metal cutting, many of the largest plants have equipped their machines with this new
SIMONDS
"RED STREAK"
INSERTED TOOTH SAW
Experience has shown that it gives many times more production than the ordinary saw and resists wear a great deal longer.
The curved gullets of new design and shape, and the scientific arrangement of teeth of High Speed Steel, chamber the metal chips and remove them without clogging or welding to the sides of the saw or teeth.
We welcome your inquiries about this saw, or any questions you may have regarding metal cutting.
Write us.
SIMONDS SAW & STEEL CO.
"The Saw Makers"
Established 1832
Fitchburg, Mass.
SIMONDS

dence regarding outstanding quotations, mostly from Middle West manufacturers. Local used tool dealers are doing a moderate business in small equipment.

NEW YORK

Kieley & Mueller, Inc., 34 West Thirteenth Street, New York, manufacturer of steam specialties, purchased one-story factory, 135 x 185 ft., at Paris and Niagara Streets, Newark, N. J. Company will move to new plant and increase capacity.

Signal Supply Officer, Army Department, Army Base, Brooklyn, asking bids until Nov. 17 for 53,086 ft. cable and 18 reels.

New York Power & Light Co., Albany, N. Y., will build steel tower transmission line from point near Albany to Westchester County, where power substation will be built for connection with system of New York Edison Co. Cost, $7,500,000. First noted company operated by Niagara Hudson Power Corpn., Buffalo.

Thomas M. Russell, 55 East Ninety-fifth Street, New York, and Frederick H. Rohlfs, 2101 Beekman Place, Brooklyn, organized Die Cast & Forge Corpn., to manufacture die-castings, hardware specialties, etc.

Superintendent of Lighthouses, Third District, Staten Island, N. Y., asking bids until Nov. 16 for 13 steel bodies for light buoys, each with skeleton lantern tower and bottom counterweight; 9 ft. diameter by 38 ft. long to 5 ft. diameter by 15 ft. long.

Department of Correction, State Office Building, Albany, N. Y., asking bids until Nov. 24 for elevated tank at Sing Sing Prison, Ossining, N. Y.

Department of Docks, Pier A, North River, New York, let contract to Allen N. Spooner & Son, Inc., Pier 11, North River, for three piers on Hudson River waterfront, each 1100 ft. long. Cost $4,990,000, including equipment.

National Biscuit Co., 449 West Fourteenth Street, New York, contemplates call for bids in 60 to 90 days for multi-story addition. Cost over $450,000 with equipment.

M. Friedlander Machine Co., Inc., Bronx, New York, organized by Max Friedlander, 744 East 181st Street, and associates, capital $10,000, plans operation of machine works.

Bureau of Supplies and Accounts, Navy Department, Washington, asking bids until Nov. 24 for one motor-driven engine lathe for Brooklyn Navy Yard.

Texas Corpn., 135 East Forty-fifth Street, New York, erecting superstructure for two-story oil storage and distributing plant at Ossining, N. Y. Cost $50,000 with equipment. Closson-Parkhurst Engineering Co., 450 Seventh Avenue, New York, general contractor.

Western Electric Co., 195 Broadway, New York, manufacturer of telephone cable, instruments, etc., organized Tottenville Copper Co., Inc., a subsidiary, to operate plant of same name, Tottenville, S. I., recently acquired. Frederic W. Willard will be executive vice-president. Company will also operate Nassau Smelting & Refining Works, Ltd., 603 West Twenty-ninth Street, acquired by parent organization.

Board of Education, Pompton Lakes, N. J., plans manual training department in two-story and basement senior high school. Cost $230,000; bids on general contract called in December. Hacker & Hacker, 210 Main Street, Fort Lee, N. J., architects.

Joseph Cooperman, Newark, N. J., leased one-story building at 556 Market Street for automobile spring and welding works.

Wolstenholme Engineering Co., Paterson, N. J., care of Maurice Sanders, 64 Hamilton Street, attorney, organized by Harry F. Wolstenholme, Paterson, and associates, capital $250,000. To manufacture gasoline engines and parts.

John G. Helmers, 147 Summit Avenue, Union City, N. J., architect, has plans for two-story automobile service, repair and garage building. Cost over $100,000 with equipment.

Board of Education, Hawthorne, N. J., to build multi-story high school. Cost $475,000 with manual training department. Fanning & Shaw, 49 Ward Street, Paterson, N. J., architects.

Sheffield Mfg. Co., Newark, N. J., care of Jerome Alper, 207 Market Street, attorney, organized with capital $125,000 by Joseph Bower and Samuel Johnson, Newark. To manufacture safety razor blades.

C. J. Vanderbeck & Son, Paterson, N. J., boiler makers and steel plate constructors. Occupying new plant at Genessee and West Railway Avenues.

NEW ENGLAND

Ernest W. Skinner Co., Fitchburg, Mass., manufacturer of oil burners, plans one-story addition, 60 x 100 ft. Cost over $25,000 with equipment.

School Board, Bridgeport, Conn., has plans for three-story junior high school, with four manual training shops. Cost over $250,000. Frederick J. Dixon, Bridgeport, architect.

Bureau Yards and Docks, Navy Department, Washington, asking bids until Nov. 18 for 90,000-gal. steel tank for gasoline storage, floating deck, roof, steel stairs, etc., for naval fuel depot, Melville, R. I.

Atlantic Ornamental Iron & Wire Works, Inc., Boston, organized by Albert H. Sibley, 305 Western Avenue (president and treasurer), capital $10,000. To manufacture iron, steel, bronze and other metal products.

Merrimac Chemical Co., Everett, Mass., let general contract to A. C. Peters, 46 Cornhill Street, Boston, for one-story bottling plant, 60 x 100 ft. Cost $45,000 with machinery. Plans completed for one-story acid plant. Cost over $50,000 including equipment.

School Board, Brookline, Mass., authorized manual training department in three story William H. Lincoln grade school, now under way. Cost $350,000. Maurice P. Meade, 80 Boylston Street, Boston, architect.

Connecticut Light & Power Co., Hartford, Conn., asked bids on general contract for part one and two-story equipment storage, repair and distributing plant, 82 x 150 ft. at Meriden, Conn. Cost over $75,000 with equipment. United Engineers & Constructors, Inc., 112 North Broad Street, Philadelphia, architect and engineer.

Bureau of Supplies and Accounts, Navy Department, Washington, asking bids until Nov. 17 for one rock crusher for Portsmouth, N. H., yard; until Nov. 24 for one motor-driven tractor.

M. A. Farnham and Jack Churchward, New Haven, Conn., formed Churchward Engineering Co., Inc., capital $50,000. To manufacture welding equipment and devices.

Greenwich Mills, East Greenwich, R. I., will require motors and miscellaneous equipment for plant addition.

Viking Flying Boat Co., New Haven, Conn., closed bids Nov. 5 for airplane hangar, machine shop and office.

PHILADELPHIA

Jeanstan Mfg. Co., Philadelphia, leased space at 141 North Third Street, for manufacture of metal lamps and metal novelties.

Elin Co., 330 Washington Street, Newark, N. J., electric refrigerators, leased two-story building at Upper Darby, Philadelphia, for storage and distribution.

Board of Education, Downingtown, Pa., plans manual training department in new junior and senior high school. Cost over $200,000. Bids on general contract until Nov. 18. John H. Mowere, Phoenixville, Pa., architect.

Holyoke Heater Co., Holyoke, Mass., manufacturer of hot water heaters, leased space in unit of Bailey Warehouses, Philadelphia, for branch storage and distributing plant.

Bureau of Supplies and Accounts, Navy Department, Washington, asking bids until Nov. 17 for one automatic arc welding machine, until Nov. 24 for one motor-driven engine lathe for Philadelphia Navy Yard.

E. I. duPont deNemours & Co., Wilmington, Del., authorized one-story addition to plant at Deepwater Point, N. J., for manufacture of synthetic rubber. Cost over $100,000 with equipment.

William J. Ellis, commissioner, Institutions and Agencies, State Office Building, Trenton, N. J., asking bids until Nov. 23 for high and low pressure boilers, etc., for State institution, Clinton, N. J.

Neon Electric Sign Co., Philadelphia, organized by Paul Green, 4082 East Roosevelt Boulevard, and associates. To manufacture electric signs and displays.

Bond Mfg. Corpn., Fourteenth and Locust Streets, Wilmington, Del., manufacturer of collapsible tubing, bottle caps and other metal products, let contract to John E. Healy & Sons, Westover Road and Kenneth Park, for one-story addition, 60 x 300 ft. Cost $60,000 with equipment. Brown & Whiteside, Inc., duPont Building, architect.

Manager, Bloomsburg Airport, Bloomsburg, Pa., asked bids on general contract for hangar with repair shop. Cost over $40,000 with equipment. Ballinger Co., Twelfth and Chestnut Streets, Philadelphia, architect and engineer.

Caloric Stove Works, Topton, Pa., operating at capacity, giving employment to largest number of workers in history of business.

Philco Radio Corpn., subsidiary of Philadelphia Storage Battery Co., Ontario and C Streets, Philadelphia, operating on production schedule of 9000 radio sets daily.

PITTSBURGH

McKeesport Coal & Coke Co., Keystone Building, Pittsburgh, applied for permission to build coal dock on Youghiogheny River, McKeesport, Pa.

Harry I. Neaman, 7612 Bennett Street, Pittsburgh, and associates organized Capitol Renewable Fuse Co., capital $25,000. To manufacture electric fuses and other electrical equipment.

Albert Packing Co., Washington, Pa., meat packer, awarded general contract to R. M. Day, 250 Donnam Avenue, for one-story plant. Cost $45,000 with equipment.

Appalachian Electric Power Co., Charleston, W. Va., contemplates expansion in Huntington, W. Va., district, including additions in transmission and distributing lines, power substations, etc. Cost over $1,000,000 with equipment.

Westinghouse Electric & Mfg. Co., East Pittsburgh, plans production of electric refrigerator units at Hamilton, Ont. Plant operated in name of Canadian Westinghouse Co.

United States Engineer Office, Huntington, W. Va., asking bids until Nov. 16 for one 1000-gal. steel tank and 19 550-gal. capacity steel tanks; for 80 cast steel weir wicket boxes, seven cast steel gear sections, four steel lever pins, four cast steel links, eight steel link pins, etc.; until Nov. 17 for one steel portable garage.

Board of Education, Bellevue, Pa., contemplates manual training department in new senior and junior high school. Cost about $275,000. Edward Stotz, Bessemer Building, Pittsburgh, architect.

Board of Public Education, Administration Building, Pittsburgh, asking bids until Nov. 17 for unit heaters, ventilating equipment, etc., for Westinghouse high school; until Nov. 18 for 1000 steel tablet arm chairs, steel lockers, electric oven and other equipment for high schools.

Standard Plate Glass Co., Butler, Pa., running on day and night schedules, employing over 200 men.

SOUTH ATLANTIC

Baltimore Tube Co., 1301 Wicomico Street, Baltimore, manufacturer of seamless brass and copper tubing, etc., let general contract to Dietrich Brothers, Inc., 220 East Pleasant Street, for one-story addition, 110 x 250 ft. Cost over $75,000 with equipment.

Department of Commerce, Washington, asking bids until Nov. 16 for 200 galvanized, fabricated shields for obstruction lights.

Warren Co., Inc., Atlanta, Ga., manufacturer of refrigerators, will rebuild part of plant destroyed by fire Nov. 3. Loss $50,000 including equipment.

Augusta Canal Co., Augusta, Ga., revising plans for hydroelectric generating plant. Cost about $1,000,000 with transmission system. Burns & McDonnell Engineering Co., Interstate Building, Kansas City, Mo., consulting engineer.

Anne Arundel County Public School Building Commission, Annapolis, Md., plans manual training department in three-story high school at Glen Burnie, Md. Samuel B. Dove, 3 Acton Place, Annapolis, general contractor. Buckler & Fenhagen, 325 North Charles Street, Baltimore, architects.

Bureau of Yards and Docks, Navy Department, Washington, asking bids (no closing date stated) for two automatic refrigerating machines for navy yard, Charleston, S. C.

Trojan Composition Corpn., 12 Muirhead Avenue, Trenton, N. J., manufacturer of

Arc welding on a large pasteurizer "shell", fabricated from standard structural shapes and plates

Frame for spot welding machine. Entire framework is made up of structural angles fabricated by electric arc welding.

STRUCTURAL STEEL

SIMPLIFIES CONSTRUCTION

Simplified construction is a major advantage in the use of riveted or welded Structural Steel for machinery and machine parts, particularly bases and frames. Structural Steel requires no patterns. The time between design and delivery is materially shortened. A great variety of parts can be made from a very few selected sections, thus only a comparatively small stock need be carried. The strength of Structural Steel is high in proportion to its weight and bulk. Reduced weight is reflected not only in reduced costs of manufacture and transportation, but also in the corresponding saving in weight and cost of supporting elements. Structural Steel is a highly worked product. The likelihood of defects is largely removed and the rolling process further imparts a high degree of ductility to the steel, thereby increasing its reliability in service.

Carnegie engineers will gladly consult with you regarding the use of Structural Steel in machine construction. The advantages of Structural Steel are not confined to large construction, but apply with equal economy and satisfaction to many smaller items.

Arc welded base for grinder, fabricated from simple I-beam and plates. Simple design gives pleasing appearance.

Photos—Courtesy of Lincoln Electric Company

CARNEGIE STEEL COMPANY·· PITTSBURGH PA·

Subsidiary of United States Steel Corporation

patented cups for oil-drilling machinery and other equipment. Planning to move to Havre de Grace, Md.

Champion Fibre Co., Canton, N. C., manufacturer of fiber board, corrugated board, etc., let general contract to Morton C. Tuttle Co., 31 St. James Avenue, Boston, for mill additions. Cost over $1,000,000 with machinery. Company contemplates impounding dam for power facilities on Pigeon River to cost over $150,000.

General Purchasing Officer, Panama Canal, Washington, asking bids until Nov. 17 for chain pipe wrenches, wrought iron pipe, metal slitting saws, 250 gross machine screw nuts, wrought iron fittings and other supplies; until Dec. 10 for plate steel penstocks and outlet pipes for Madden power plant, Canal Zone.

Department of Public Buildings and Public Parks, Navy Building, Washington, let contract to B-W Construction Co., 726 North Wabash Avenue, Chicago, for seven-story and basement storage and distributing plant. Total cost $1,025,000. Lockwood Greene Engineers, Inc., 100 East Forty-second Street, New York, consulting engineer.

Maryland Paper Board Co., Childs, Md., organized to take over Marley Paper Mill for corrugated and other paper board manufacture. Carroll T. Gardner, general manager.

Willard Toy Mfg. Co., Inc., 2400 Frederick Avenue, Baltimore, will install band saws, dowel machines and other equipment for expansion.

BUFFALO

Savory, Inc., 90 Alabama Street, Buffalo, manufacturer of sheet metal products and tinware, will remove Central Stamping Co., 591 Ferry Street, Newark, N. J., recently acquired, to Buffalo where production will be concentrated. Purchasing company also operates Buffalo Can Co., 240 Clinton Street.

Dwight F. Johnson, chairman, Municipal Board, Newark, N. Y., asking bids until Nov. 24 for gas engine, blowers, electric motors, valves and other equipment for sewage treatment plant. Leroy H. Wright, City Hall, village engineer; Glenn D. Holmes, 249 East Water Street, Syracuse, N. Y., consulting engineer.

United Universal Corpn., Rochester, N. Y., organized by Joseph B. Robinson and Howard S. Slaght, 154 Middlesex Road. To manufacture electrical and mechanical equipment.

Niagara Hudson Power Corpn., Buffalo, negotiating with Lycoming Natural Gas Co., Wayne, N. Y., subsidiary of Standard Oil Co., 26 Broadway, New York, for natural gas supply for distribution at Syracuse, N. Y., and vicinity. Project will include distributing plant, fittings and equipment, also pipe line from Wayne gas field. Cost over $500,000.

Oswego Independent Ice Corpn., Oswego, N. Y., to build one-story ice-manufacturing and cold storage plant, 80 x 100 ft. Cost over $50,000 with machinery.

DETROIT

Alaska Refrigerator Corpn., Muskegon, Mich., manufacturer of refrigerators and refrigerator equipment, let general contract to Muskegon Construction Co., Muskegon, for extensions and improvements. Cost $40,000 with equipment. Company is subsidiary of Norge Corpn., Detroit, manufacturer of electric refrigerator units.

Ford Motor Co., Dearborn, Mich., building new plant at Ypsilanti, Mich. Cost over $100,000 with equipment. Company is erecting hydroelectric generating plant at same location. Cost over $300,000 with machinery. Albert Kahn, Inc., Detroit, architect and engineer. Company authorized expansion at River Rouge plant. Cost $500,000 including equipment.

International Metal Products, Inc., 512 Capital Bank Tower, Lansing, Mich., organized by William P. Reilly, 1076 Maryland Street, Grosse Pointe Park, Detroit, capital $10,000. To manufacture metal goods.

Muskegon Dock & Fuel Co., Muskegon, Mich., subsidiary of Sand Products Corpn., First National Bank Building, Detroit, acquired property on Lake Muskegon. Plans construction of dock, with storage and distributing plant. Cost $225,000 with equipment.

Detroit Zoological Commission, Woodward Avenue and Nine Mile Road, Detroit, plans steam power house, 50 x 50 ft. Cost $45,000 with equipment. Donaldson & Meier, Washington Boulevard Building, architects.

Board of Supervisors, Newaygo County, Whitecloud, Mich., plans hangar with repair shop, etc., at airport. Cost $25,000.

Spring Lake Boat Co., Fruitport, Mich., recently organized by James M. Spencer and others, acquired former car barns on Spring Lake waterfront for construction of motor boats, yachts and other craft. Mr. Spencer and John Gurnee in charge.

Hodges Tool & Die Co., Grand Rapids, Mich., operating at capacity with day and night forces.

Federal-Mogul Corpn., 11031 Shoemaker Street, Detroit, manufacturer of automotive bronze castings, motor bearings, bushings, etc., will develop new line of propeller wheels for aircraft.

CLEVELAND

Universal Pipe Co., Sandusky, Ohio, considering one-story plant for manufacture of metallic pipe. Cost $35,000 with equipment.

National Milling Co., 2221 Front Street, Toledo, Ohio, awarded general contract to MacDonald Engineering Co., 1 North LaSalle Street, Chicago, for rebuilding section of grain mill and elevator destroyed by fire. Cost over $100,000 with equipment.

Neubauer Metal Products Co., Cleveland, care Leonard M. Blum, Engineers' Building, representative, organized by Ferdinand Neubauer and associates. To manufacture metal goods.

City Council, Dover, Ohio, authorized $85,000 for extensions and improvements in municipal electric light and power plant. Robert Miller, chief engineer, municipal station.

Board of Directors, Mahoning Valley Sanitary District, 901 City Bank Building, Youngstown, asking bids until Nov. 20 for pumping station discharge piping, Meander Creek pumping plant. W. H. Dittoe, chief engineer.

City Council, Willard, Ohio, authorized $62,000 for extensions and improvements in municipal electric light and power plant and waterworks.

CHICAGO

City Council, LaSalle, Ill., plans municipal electric light and power house. Cost over $90,000 with equipment. Burns & McDonnell Engineering Co., Interstate Building, Kansas City, Mo., consulting engineer.

Signal Corps Procurement District, Army Department, Chicago, asking bids until Nov. 17 for quantity of induction coils, machine screws, brass name plates, etc.

Board of Education, Ottawa, Ill., will begin superstructure for manual training shop at high school. Cost over $100,000 with equipment. Joseph Llewellyn Co., First National Bank Building, Chicago, architect.

Auto Parts & Gear Co., 2559 Milwaukee Street, Chicago, manufacturer of automotive gears and equipment, plans one-story and basement addition. Cost about $27,000 with equipment. I. S. Stern, 185 North Wabash Avenue, architect.

Montana-Dakota Power Co., Minneapolis, approved plans for improvements and one-story addition, 71 x 73 ft., in steam-operated electric generating plant at Columbus, N. D. Cost over $250,000 with equipment.

Berst-Forster-Dixfield Co., Cloquet, Minn., manufacturer of wood products, asking bids for three-story and basement plant, 105 x 274 ft. Cost over $100,000 with machinery. Homan W. Hallock, Oswego, N. Y., architect.

Board of Education, Sioux Falls, S. D., plans four-story and basement high school with manual training department. Cost $500,000. Perkins & McWayne, Paulton Block, architects.

Bureau of Reclamation, Denver, Colo., asking bids until Nov. 23 for one automobile service and garage building, 71 x 151 ft., at Boulder City, Nev.

Board of Commissioners, Aberdeen, S. D., asking bids until Nov. 16 for one stationary gasoline engine for operating centrifugal water pump, 1800-gal. a min. capacity.

City Council, Rochester, Minn., contemplates new municipal gas distributing plant and system. Cost over $90,000. Burns & McDonnell Engineering Co., Interstate Building, Kansas City, Mo., consulting engineer.

Plateau Valley Light & Power Co., Collbran, Colo., considering new steam-operated electric light and power plant. Cost $50,000 including equipment.

Superior Brass Foundry, 84 Eleventh Street, Waterloo, Iowa. C. H. Harmon has acquired interest of partner, H. L. Wheelock. Company makes brass and aluminum castings.

City Council, Sullivan, Mo., opened bids Nov. 12 on $80,000 bond issue for a municipal light and power plant. W. A. Fuller Co., St. Louis, engineer.

MILWAUKEE

National Utilities Corpn., former affiliate of National Brake & Electric Co., Milwaukee, taken over by National Utilities Co. Will resume manufacture of water pumps and complete units for rural and suburban districts of deep well pneumatic type. Machinery will be transferred to plant at 5425 West State Street, Milwaukee, where addition will be built next spring.

Solenoid Co., Milwaukee, organized by Panfilo Trombetta to manufacture special direct current solenoids and electromagnets. For present, manufacturing will be done under contract with Sterling Tool & Mfg. Co., 3167 North Thirtieth Street, Milwaukee. Mr. Trombetta formerly was associated in research work with General Electric Co., Rochester, N. Y.; Allen-Bradley Co. and A. O. Smith Corpn., Milwaukee.

Lutz Ice Co., 109 North Morrison Street, Appleton, Wis., plans artificial ice producing plant, 85 x 150 ft., one and two stories.

Young Radiator Co., Racine, Wis., maker of radiators, cooling systems and heating units. Reports increased activity; during September and October worked day and night shifts in its sheet metal, stamping and assembling departments.

INDIANA

Board of Trustees, Indiana State Reformatory, Pendleton, authorized three-story and basement industrial building, 40 x 200 ft. Cost over $85,000 with equipment.

Frank J. Rembusch, Shelbyville, manufacturer of screens, metal novelties, etc., will rebuild plant damaged by fire. Loss $25,000 with equipment.

Board of School Commissioners, Connersville, contemplates installation manual training equipment in two-story and basement high school. Cost $175,000. H. P. Bartlett, 6017 Lowell Avenue, Indianapolis, architect.

Lever Brothers Co., Cambridge, Mass., manufacturer of soaps, washing powders, etc., plan four-story and basement addition to Hammond plant and other improvements. Cost over $500,000 with equipment. Stone & Webster Engineering Co., Boston, architect and engineer.

Aircraft Engineering Corpn., Indianapolis, recently organized by Richard A. Kurtz, Seventy-seventh Street, and associates. To manufacture airplanes and parts. C. J. Vogelsang and J. W. Spresser, Indianapolis, among heads of company.

Illinois Carton & Label Co., 2601 North Crawford Avenue, Chicago, manufacturer of corrugated and other paper containers, will take bids soon for one-story plant, 130 x 200 ft., at Elkhart. Cost about $60,000 with machinery.

C. A. Mfg. Co. and Adjustable Bearing Co., Indianapolis. Planning to move to Crawfordsville, Ind. Former makes wood-working tools, latter automobile bearings. C. A. Maris heads both companies.

Noblitt-Sparks Industries, Inc., Indianapolis, will move central offices to Columbus, Ind. Company makes steel specialties, including steel tubing for bicycles, and has branches at Columbus, Seymour and Greenwood, Ind.

Zollner Machine Works, Inc., Fort Wayne, Ind. Company has stopped operations at Duluth, Minn., and is occupying new plant here.

Terre Haute Malleable Co., Terre Haute, plant damaged by fire. Loss $50,000.

GULF STATES

Texas Public Service Co., San Angelo, Tex., to build plant at Texon, Tex., for removal of sulphur from natural gas. Cost about $100,000 with equipment. Output will be used for service at Big Lake, Tex., where Common Council recently authorized plant and system to cost $50,000.

Slate Aircraft Corpn., Glendale, Cal., manufacturer of all-metal airplanes, considering branch plant at or near Dallas, Tex., including hangar with repair shop. Cost over $65,000 with equipment.

Airport Commissioner, City Hall, Mobile,

For exacting needs

PRACTICALLY all Roebling Flat Wire is custom-made. Our shops handle thousands of flat wire orders yearly—but seldom are any two specifications alike. This is because we specialize in flat wire of highest quality, to meet the distinctive—and usually exacting—needs of each of our customers. ¶ We invite your inquiry regarding our specialized experience of over 40 years, our exceptional manufacturing facilities, and our prices. Roebling Flat Wire is made of cold rolled high or low carbon steel, in various widths, thicknesses and finishes including galvanized and tinned. ¶ We are especially well-equipped to make high carbon flats, tempered or untempered, and in any finish.

JOHN A. ROEBLING'S SONS CO., TRENTON, N. J.

WIRE • WIRE ROPE • COPPER AND INSULATED WIRES AND CABLES
WELDING WIRE • FLAT WIRE • WIRE CLOTH AND WIRE NETTING

New York Boston Chicago Philadelphia Atlanta Cleveland
San Francisco Los Angeles Seattle Portland

ROEBLING FLAT WIRE

Ala., plans hangar unit, shop facilities, etc., at municipal airport. Cost $75,000.

H. C. Badger, Amarillo, Tex., and associates plan one-story ice-manufacturing plant, 75 x 145 ft. Cost $55,000 with machinery.

Board of City Commissioners, Borger, Tex., considering municipal gas plant and electric power station. John R. Miller, mayor, active in project.

Carpenter Envelope Co. of Texas, Inc., San Antonio, Tex., recently organized by Charles E. Schoff, 1124 West Woodlawn Street, and associates, capital $25,000, leased property at 301 South Flores Street, for paper converting plant. Capacity of initial works about 500,000 envelopes daily.

Lee Bowman, 1409 Pacific Avenue, Dallas, Tex., temporary address, contemplates establishment of plant for production of aircraft motors of special type, including parts production and assembling.

Board of Trustees, Tuskegee Normal and Industrial Institute, Tuskegee, Ala., let contract to T. C. Windham & Sons, 1620 Fourth Street North, Birmingham, for three-story and basement Thomas A. Edison Science school, 80 x 164 ft. Cost about $275,000 with equipment. Taylor & Persley, school architects; C. E. Posey, 2159 Eleventh Court, Birmingham, engineer.

Board of Trustees, Caledonia Consolidated School District, Columbus, Miss., J. R. Vaughn, school superintendent, plans one-story vocational school.

Jefferson Lake Oil Co., Abbeville, La., erecting sulphur production plant at Lake Peigneur, near Abbeville. Cost over $350,000.

ST. LOUIS

Kinloch Brass Casting Co., 2356 Palm Street, St. Louis, asked bids for one-story foundry, 59 x 70 ft. Cost about $24,000 with equipment. William P. McMahon, Buder Building, architect.

Loose-Wiles Biscuit Co., 1100 West Eighth Street, Kansas City, Mo., will build early next year multi-story plant at Los Angeles. Cost over $1,000,000 with equipment.

Bureau of Federal Prisons, Washington, Sanford Bates, superintendent, will call for bids soon for mechanical shops and power house at reformatory, El Reno, Okla. Cost $150,000 with equipment. Hawk & Parr, Hales Building, Oklahoma City, Okla., architects.

James R. Kearney Corpn., 4232 Clayton Avenue, St. Louis, manufacturer of mechanical products, acquired Chance Co., Centralia, Mo., manufacturer of electrical specialties; National Duct Rod Co., Portland, Ore., and Morse-Sterrett Products Co., Oakland, Cal., manufacturer steel wire cutters, guy clamps, clips, etc. Plant of National Duct Rod Co. will be removed to St. Louis and production concentrated with purchasing company; certain departments of other two companies, including engineering divisions, will be transferred to St. Louis. Capacity of Centralia plant to be increased, adding number of products manufactured by affiliated companies.

Kranz Automotive Body Co., 3032 Gravois Avenue, St. Louis, let contract to Henry Dilschneider Real Estate & Building Co., 7914 Kingsbury Road, for one-story plant, 55 x 125 ft. Cost $40,000 with equipment. Aegerter & Bailey, Railway Exchange Building, architects.

Kansas City Power & Light Co., Fourteenth Street and Grand Avenue, Kansas City, Mo., will build substation, 67 x 180 ft. Cost about $75,000 with machinery. H. G. Freshman, company architect, in charge.

Great Lakes Pipe Line Co., Ponca City, Okla., authorized oil storage and distributing plant at Okmulgee, Okla., 60,000 gal. capacity. Cost $50,000 with equipment.

Rose Packing Co., Emporia, Kan., meat packer, will build one-story addition, 50 x 130 ft., cost about $35,000 with equipment.

Kansas City Industrial Gas Fuel Co., Kansas City, Mo., care of Burns & McDonnell Engineering Co., Interstate Building, engineer, considering installation of industrial gas system for city, with storage and distributing plants. Cost over $1,500,000.

CINCINNATI

Cleveland-Canton-Columbus Motor Freight Co., 83 Terminal Way, Columbus, Ohio, let general contract to Middle States Construction Co., 1183 Essex Avenue, for freight dock. Cost over $75,000 with loading and other equipment. H. M. Morse & Co., Finance Building, Cleveland, architects.

Contracting Officer, Wright Field, Dayton, Ohio, asking bids until Nov. 16 for two electric-operated elevating trucks.

City Council, Piqua, Ohio, plans municipal electric light and power plant. Cost $810,000 with equipment. Burns & McDonnell Engineering Co., Interstate Building, Kansas City, Mo., consulting engineer.

Ohio Oil Co., Findlay, Ohio, taken over oil and gas properties of Mountain States Oil & Gas Co., Odgen, Utah, in Weiser-Payette district, Idaho, producing on royalty basis. Ohio company will install drilling and power equipment, pipe lines, for development. Initial investment over $500,000.

Southern Cold Storage Co., Cleveland, Tenn., will rebuild part of ice and refrigerating plant destroyed by fire. Loss $40,000 with machinery.

City Council, Versailles, Ky., will install electric-operated pumping machinery in connection with waterworks extensions. Cost $50,000. Howard K. Bell, Lexington, Ky., consulting engineer.

International Harvester Co., Chicago, increasing operations at branch plant at Chattanooga, Tenn., adding 175 workers to force.

Buckeye Portable Tool Co., Dayton, Ohio. Factory and offices moved to 29 West Apple Street.

PACIFIC COAST

Pacific Hard Rubber Co., operated by Stauffer Chemical Co., 3200 East Twenty-sixth Street, Los Angeles, let general contract to Austin Co. of California, Inc., for one-story plant, totaling 16,000 sq. ft. Cost $50,000 with equipment.

City Council, San Diego, Cal., authorized call for bids for equipment for municipal power plant for street-lighting system, including Diesel engine units. City engineer, City Hall, in charge.

Southern Sierras Power Co., Riverside, Cal., plans extensions and improvements in transmission lines and station in Imperial Valley district. Cost $40,000 with equipment.

Bureau of Supplies and Accounts, Navy Department, Washington, asking bids until Nov. 24 for one motor-driven engine lathe for Mare Island Navy Yard.

Los Angeles City School District, 1151 South Broadway, Los Angeles, plans one-story vocational shop, 70 x 140 ft., to school on South San Pedro Street. Cost $100,000. Edwin Bergstrom, Citizens National Bank Building, architect.

York Aircraft, Ltd., Los Angeles, care of Benjamin S. Hunter, 816 Pacific Mutual Building, organized by Y. O. York, Arthur R. Burbee, Long Beach, and others, capital $200,000. To manufacture airplanes and parts.

E. I. Whiting and Albert E. Anderson, St. Johns, Ariz., applied for permission to build electric light and power plant. Cost over $80,000.

California-Oregon Power Co., 58 Sutter Street, San Francisco, secured permission to issue $3,000,000 in bonds and 5000 shares preferred stock. Part of fund for extensions and improvements in plants and system.

Bureau of Federal Prisons, Washington, asked bids for machine shops at penitentiary, McNeil Island, Wash. George Gove, Puget Sound Bank Building, Tacoma, Wash., architect.

City Steam Heating Co., Everett, Wash., approved plans for extensions in power house and distributing lines. Cost $30,000.

Filice & Perrelli, Gilroy, Cal., operating canning plants, plans one-story cannery at Gilroy. Cost over $50,000 with equipment. William Knowles, 1214 Webster Street, Oakland, Cal., architect.

City Council, Bonners Ferry, Idaho, contemplates municipal electric power plant, using Diesel oil engine unit. Cost $25,000 with equipment.

CANADA

Lolmes Brothers & Co., Lunenburg, N. S., will build machine shop, 60 x 80 ft. Cost $20,000. William A. Smith, general contractor.

Port Carling Boat Works, Port Carling, Ont., plant destroyed by fire. Loss $50,000. Will rebuild.

Simrall Refining Corpn. of Canada, Ltd., care of J. J. MacLennan, 15 King Street West, Toronto, receiving bids for petroleum refinery at Amherstburg, Ont. Company has purchased 1000 acres on Detroit River for further extensions. Simrall Refining Co., Cincinnati, is parent company.

City Council, Cap De La Madeleine, Que., contemplates purchase of new pump for waterworks plant. Cost $10,000. A. Plamondon, 30 St. James Street West, Montreal, engineer.

Gidley Boat Co., Penetanguishene, Ont., plant destroyed by fire. Loss $200,000. Owners considering rebuilding.

FOREIGN

Soviet Russian Government, Moscow, plans hydroelectric generating plant on Volga River, near Samara, Russia; capacity 1,548,000 hp. Cost 1,200,000,000 rubles (about $600,000,000) with transmission system. Work begins early next year. Hugh L. Cooper, 101 Park Avenue, New York, consulting engineer. Amtorg Trading Corpn., 261 Fifth Avenue, New York, official buying agency.

Supply and Tenders Committee, Department of Public Works, Wellington, New Zealand, asking bids until Jan. 26 for one 25-ton electric traveling crane, double girder, overhead type.

Fiat Co., Milan, Italy, manufacturer of automobiles, licensed State Engineering Works, Warsaw, Poland, to produce Fiat type automobiles and equipment for sale in Poland on royalty basis. Fund of $1,000,000 available to State works for expansion.

Public Works Department, Rome, Italy, authorized by Government to expend $7,890,000 for expansion and improvements, primarily in northern Italy, including hydraulic development, $5,610,000; port works and equipment, $464,000; railways and equipment, $263,000; remainder of fund for miscellaneous work.

State Electricity Commission, Victoria, Australia, asking bids until Jan. 4 for quantity lead-covered wire and armored cable.

New Trade Publications

Die Making Machines.—Oliver Instrument Co., Adrian, Mich. Pamphlet devoted to improved machines for sawing out, filing and lapping dies and flat metal specialties. New models include a heavy-duty machine for dies up to 3 in. thick.

Roll Grinding Machines.—Cincinnati Grinders, Inc., Cincinnati. New 20 to 36-in. machines are described and illustrated in 20-page catalog. Specifications are listed for 49 sizes of roll grinders.

Gear Pumps.—Schutte & Koerting Co., Philadelphia. Bulletin 17-A covers spur and herringbone gear pumps for oils and other liquids. Applications include circulation of oil to quenching tanks in heat-treating plants, fuel oil service in power plants, and lubricant and coolant feed in connection with machine tool operation. Specification and dimensions data are given.

Individual Motor Drives. — Hertzler & Zook Co., Belleville, Pa. Catalog describing individual motor-drive applications to a wide range of belt-driven machine tools and other machinery.

Centrifugal Pumps. — Worthington Pump & Machinery Corpn., Harrison, N. J. New specification sheets, 4 pages each, covering single-stage volute pumps, types L, LA and LL. Also type UB, two-stage volute pump.

V-Belt Drives. — Worthington Pump & Machinery Corpn., Harrison, N. J. Multi-V-Drive description and data, showing adaptation to power transmission service, contained in new pamphlet.

Air Compressors. — Worthington Pump & Machinery Corpn., Harrison, N. J. Feather valve type vertical and horizontal compressors illustrated in 12-page booklet.

Materials Handling Pumps.—American Manganese Steel Co., 389 East

A New Service for Steel Users

ILLINOIS SCULLY STEEL WAREHOUSE COMPANY

Subsidiary of United States Steel Corporation

A Consolidation of

Illinois Steel Warehouse Company
and
Scully Steel and Iron Company

Former management of the two companies will be retained in the new organization. All Chicago warehouse stock will be consolidated at 1319 Wabansia Avenue where additional warehouse space will accommodate a greater variety of light and heavy rolled steel products, specialties and machinery.

General Offices and Warehouse
1319 Wabansia Avenue
Chicago

Warehouses
Chicago · St. Paul · St. Louis

Business as Others See It

Digest of Current Financial and Economic Opinion

WE are emerging slowly from the long depression. Review after review, however, stresses the fact that it will be a painfully slow, uphill pull. And *Annalist* "feels compelled to accept the small cheering finds of this week with caution."

But *Financial Chronicle* lists "four distinct, highly favorable developments: a quite remarkable rise in the price of wheat; a further advance in the price of silver; a marked rise in the price of petroleum; an active bond market at rising prices, always a good sign." These are all price items. New York *Times* notes "the best retail business done so far this year," and "in the wholesale merchandise markets an immediate response was noted to improved trade at retail. . . . Trade conditions, therefore, stand out in marked contrast to those which prevailed only a short time ago."

Cotton mills are active, those in Tennessee running at the highest rate, so Alexander Hamilton Institute informs us, since January, 1930. And of 800 members of the National Association of Manufacturers replying to a questionnaire, 58 per cent look for an active winter; 54 per cent have maintained wage rates or even, in a few cases, bettered them; and inventories are low.

Commerce and Finance finds "much to indicate an improving tendency in American business. . . . The barometer furnished by commodity prices and quotations for investment securities would indicate that the mercury is about as low as it ever goes, and that even a cyclone is unlikely to put it much lower."

Possible inflation from operations of the National Credit Corpn. is discussed. Federal Reserve Bank, New York, says that "It will tend to distribute rather than to expand bank credit." National City Bank, New York, agrees, seeing "merely the mobilization and transfer of credit within the banking system as a whole, to points where it is needed and can be of service."

British advantages in export trade are discussed by London and Cambridge Economic Service (through Harvard). "This stimulus will clearly continue to be effective so long as other countries remain on the gold standard. . . . There is little inducement toward higher wages in Britain, as depreciation is unlikely to raise the cost of living more than 5 per cent" above the seasonal. "Against this favorable view . . . we must put a possible further fall in world gold prices," etc.

Whether England will come back upon the gold standard, and on what basis, is discussed. Poor's argues that it will not be below par, because of her enormous investments abroad—estimated at 4 billions, sterling. Any revaluation below par would "cut down her own income from investments, and make her debtors a present" of the difference.

On the other hand, Alexander Hamilton Institute sees "a return to the gold standard, as it operated before the war, . . . not only impractical but also infeasible, because of the maldistribution of gold and because of the deflationary tendencies which such a step might have.

Both Harvard Economic Society and *Wall Street Journal* find France much more amenable to reason, and readier to cooperate with other nations for the common good. France has discovered, it is said, that she is not immune to economic sickness and that stability of German social and political order is essential to her own similar stability.

Fourteenth Street, Chicago Heights, Ill. AMSCO type C, direct-connected and belt-driven centrifugal pumps for handling abrasive mixtures are described in a 4-page circular.

Welded Mill Building Frames.—Lincoln Electric Co., Cleveland. Folder discusses arched bar frame design suitable for arc-welded construction.

Furnace Linings.—McLeod & Henry Co., Troy, N. Y. Catalog No. 231 deals with furnace refractories, including suspended furnace arches and walls, fire box blocks and cement.

Air-finishing Equipment.—Paasche Airbrush Co., 1909 Diversey Parkway, Chicago. Booklet on "Air in the Automotive Industry," illustrates wide variety of air brushes and similar equipment; also Paasche-Worthington air compressor units.

Bending Machines.—Wallace Supplies Mfg. Co., 1310 Diversey Parkway, Chicago. Bulletin No. 27 on power and hand-operated machines for cold bending of pipes, tubes, conduits, bars, rods, channels, etc. Bar cutters, hand punches, cut-off saws and other metal-working equipment are also shown.

Jig Borers.—R. Y. Ferner Co., Investment Building, Washington, "Performance Data," a 32-page booklet of reprints, illustrates various applications of Société Genevoise d'Instruments de Physique precision borers.

Greater Imports of Iron Ore

Imports of iron ore in September are reported by the Department of Commerce at 99,124 gross tons, an increase of about 8 per cent from the August total of 91,908 tons, which was the smallest month's figure since last November, and, with that exception, the smallest since November, 1923. Compared with a year ago, however, there has been a drop of more than 50 per cent.

In the nine months imports have aggregated 1,211,714 tons, which is only slightly more than half the total for the first nine months of 1930.

As usual, Chile furnished almost two-thirds of the September supply, with Russia in second place covering nearly one-half of the remainder. In the corresponding month last year Chile's contribution was a little more than two-thirds, while Russia stood fifth on the list, with less than half of this year's tonnage.

In the nine months, Chile has supplied about 52.5 per cent of the total, compared with 60 per cent in nine months last year. Russia has held second position in both instances, with Cuba and French Africa fighting it out for third and fourth places. Sweden is fifth and Spain sixth.

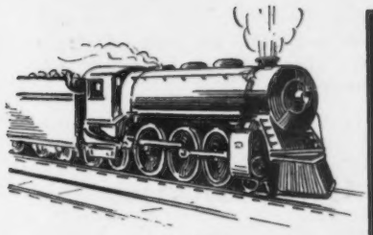
Sources of American Imports of Iron Ore

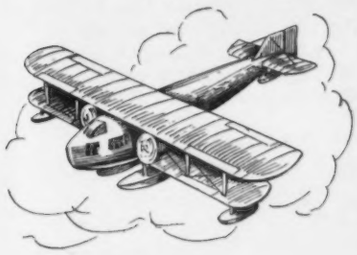
(In Gross Tons)

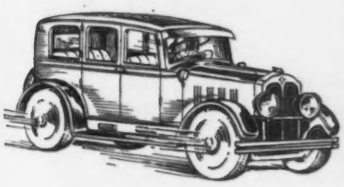
	September		Nine Months Ended September	
	1931	1930	1931	1930
Chile	65,450	147,845	637,511	1,407,575
Cuba	.....	.....	67,000	190,654
Spain	304	14,315	38,191	67,378
Sweden	.....	20,739	58,022	179,911
French Africa	.....	13,400	65,172	210,375
Canada	.....	.....	584	356
Russia	15,780	7,159	228,639	220,018
Other countries	17,590	12,035	116,595	62,542
Total	99.124	215,493	1,211,714	2,338,809

TRIED | AND | PROVED

...IN THE INDUSTRIES...







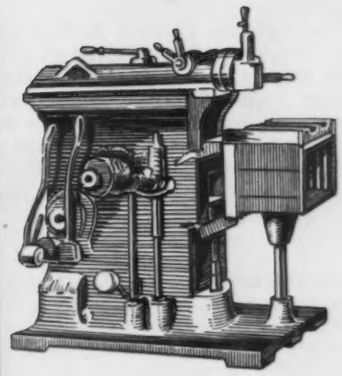
Today Mult-Au-Matics and Vertical Turret Lathes are doing representative jobs in nearly every industry where boring, turning, and facing of metals is required.

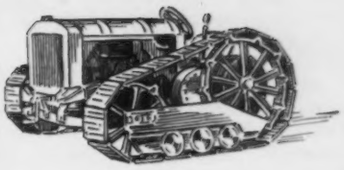
Today, also, is the time to focus attention sharply on certain items of plant operating costs and give careful thought and unbiased consideration to modern methods and equipment.

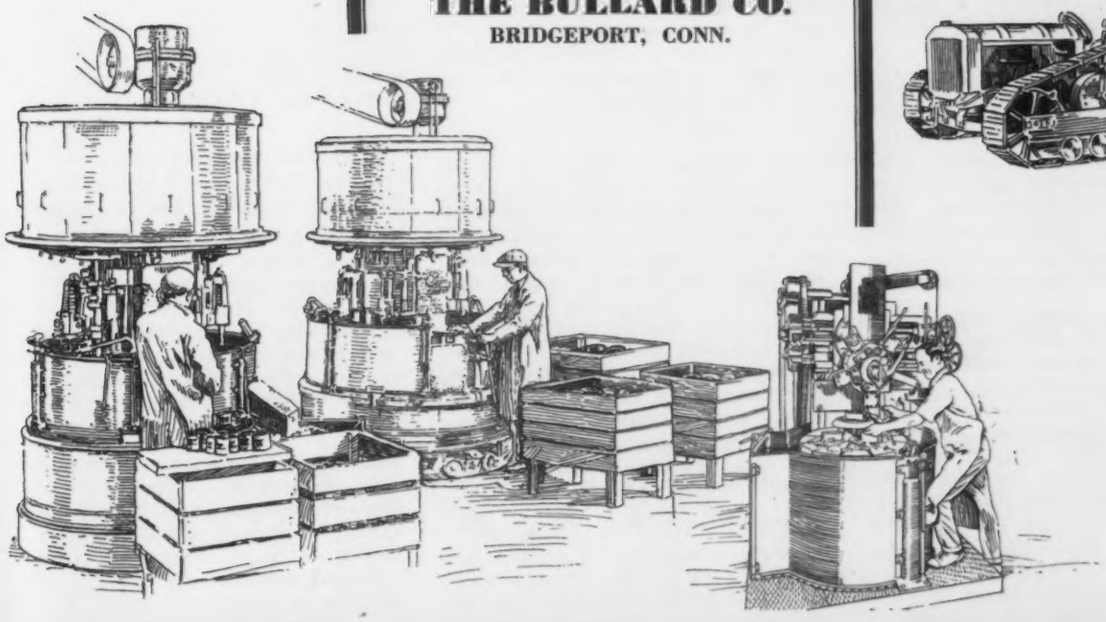
Today's equipment decision will tell Tomorrow's story of profit. Are you prepared to meet the keener competition as it comes?

Bullard Engineers will give you facts showing actual savings. Send in your problems and compare their analysis with your present costs.

THE BULLARD CO.
BRIDGEPORT, CONN.







Industrial News

Bethlehem Steel Co. has ordered two continuous furnaces for heat treating car wheels at its Johnstown, Pa., plant from Rust Engineering Co., Pittsburgh. The furnaces will be constructed with a continuously moving hearth enclosed in a furnace of circular tunnel construction, and equipment will be installed for the exact control of temperatures throughout the heat treating operation.

▲

Westinghouse Electric & Mfg. Co., East Pittsburgh, has received an order from Republic Steel Corpn. for three 300-hp. adjustable speed motors with control apparatus. These motors will be used in the tandem strip mill of Republic's Massillon, Ohio, works to furnish the drive for rolling cold strip stock of stainless steel.

▲

Stearns Conveyor Co., Cleveland, a subsidiary of Chain Belt Co., Milwaukee, has received an order for approximately 1200 troughing and return idlers of the Rex-Stearns unit casting closed-head type, to be used in construction work on the Hoover Dam.

▲

Chatard & Norris, 218 Water Street, Baltimore, have been appointed exclusive representatives of Homestead Valve Mfg. Co., Coraopolis, Pa., for eastern Maryland and the District of Columbia.

▲

Shipments of electric industrial trucks and tractors in September totaled 43 units, against 50 in August, according to reports received by the Bureau of the Census from 10 leading manufacturers. Shipments in the first nine months of 1931 totaled 573 units, compared with 910 in the corresponding period of last year.

▲

Automatic Products Co. and National Machine Products Co., both of Detroit, have been licensed by the Dardelet Threadlock Corpn., New York, to manufacture bolts and nuts, cap screws, set screws and studs threaded with Dardelet self-locking screw thread.

▲

Whitman & Barnes, Inc., Detroit, has licensed the following die shops to service Hercules interchangeable punches and retainers and to build special punch retainer plates using the Hercules principle: Milwaukee Press & Machine Co., Milwaukee; Quality Hardware & Machine Corpn., Chicago; F. M. Stambaugh & Sons, Inc., St. Louis; Buerk Tool Co., Buffalo; W. M. Steele Co., Worcester, Mass.; R. G. Smith Tool & Mfg. Co., Newark, N. J.; Schlosser Brothers, Philadelphia; Interstate Mechanical Laboratories, Inc., New York; Allen Tool Corpn., Syracuse; Taft-Peirce Mfg. Co., Woonsocket, R. I., and Superior Die Tool & Machine Co., Columbus, Ohio.

▲

Otis Steel Co., Cleveland, West Leechburg Steel Co., West Leechburg, Pa., have installed new equipment for descaling hot steel by means of high pressure water sprays. The contract for the main spray control valves as well as the remote control units was awarded to Homestead Valve Mfg. Co., Coraopolis, Pa.

▲

American Steel & Wire Co. has purchased the warehouse property at 2364 South Ashland Avenue, Chicago, vacated by Scully Steel & Iron Co., which has been consolidated with the Illinois Steel Warehouse Co.

▲

Central Iron & Steel Co., Harrisburg, Pa., is completing the installation of two additional 500-hp. fire tube boilers to be operated from waste gases from one of its open-hearth furnaces. These boilers, which will furnish steam for operating the rolling mill engines, are 22 ft. long and 9 ft. in diameter, each equipped with 470 tubes, 2½ in. in diameter. Large fans exhaust the open-hearth gas through the boilers at high velocity, while the steam is carried to the mill engines through a 12-in. steam line 2450 ft. long.

▲ ▲ ▲

Association Activities

Recent practical developments in the design and construction of concrete highways are being studied by a committee of 12 of the American Road Builders' Association. Results of the investigations will be presented at the twenty-ninth annual convention and road show in Detroit, Jan. 11-15. B. C. Briody, vice-president of the Truscon Steel Co., Youngstown, is a member of the committee.

▲

The October meeting of the Quad-City Foundrymen's Association at the Davenport, Iowa, Chamber of Commerce, was addressed by O. L. Pringle, vice-president and general manager, St. Louis Coal & Coke Corpn., on the "Production of Pig Iron." By-product coke making and blast furnace operation were briefly included in the presentation. A. E. Hageboeck, president, Frank Foundries Corpn., Moline and Davenport, who was recently elected president of the Gray Iron Institute, gave a résumé of the purpose of the institute.

▲

American Institute of Weights and Measures, 33 Rector Street, New York, has prepared a ballot for annual election of officers to serve on the institute council until December, 1934. The candidates for office include Fred A. Geier, president, Cincinnati Machine Tool Co.; E. M. Herr, chairman, Westinghouse Electric & Mfg. Co.; W. R. Ingalls, consulting mining engineer; Henry M. Leland, former president of the Society of Automotive Engineers, and Henry D. Sharpe, treasurer, Brown & Sharpe Mfg. Co.

▲

The 1932 fall meeting of the Electrochemical Society will be held in Cleveland, definite date to be arranged later. It will be a joint session with the Institute of Metals and the Iron and Steel Institute of Great Britain. The topic for discussion will be "Electric Steel."

▲ ▲ ▲

Office Changes

Moltrup Steel Products Co., Beaver Falls, Pa., has established an office in Detroit under the management of H. S. Hawthorne, formerly office manager of Firestone Rubber Co.'s Detroit office.

▲

Durable Wire Rope Co., John A. Roebling's Sons Co. and New Jersey Wire Cloth Co. have removed their Boston office and warehouse to Mills Transfer Co. Building, 51 Sleeper Street.

▲

Aluminum Industries, Inc., Cincinnati, has opened a new branch at 431 Peachtree Street, Atlanta, Ga., from which its entire line of products, manufactured in the factory at Cincinnati and the subsidiary plant at St. Cloud, Minn., will be marketed in the Southeast.

▲

Bethlehem Steel Co., McClintic-Marshall Corpn. and Kalman Steel Co., subsidiaries of the Bethlehem Steel Corpn., heretofore occupying separate offices in Chicago, have taken new quarters jointly on the fifteenth floor of the Wrigley Building.

▲

Gray Iron Institute moved its offices Nov. 1 from the Terminal Tower Building to 4300 Euclid Avenue, Cleveland.

▲

Adair-Day Corpn. has removed its offices to 1018 Girard Trust Co. Building, Philadelphia, and has added to its business the sale of centrifugally cast stainless steels, die castings and heat-treated aluminum castings.

▲ ▲ ▲

This year's conference on welding under the auspices of the engineering extension department of Purdue University will be held at Lafayette, Ind., on Dec. 10-11. Lectures, demonstrations and exhibits will comprise the program as heretofore. Prof. W. A. Knapp, Purdue University, Lafayette, Ind., is in charge of the engineering extension department.

Y-SEVENTH YEAR

East Engin.
Library

EDITORIAL INDEX..PAGE 17 MARKETS.....PAGE 1329
THIS ISSUE IN BRIEF.PAGE 19 PRODUCTS INDEX..PAGE 90
ADVERTISERS INDEX PAGE 110

THE IRON AGE

NAGEMENT
•
ODUCTION
•
DESIGN
•
ROCESSES
•
NEWS
•
MARKETS
•
STRIBUTION

NOV 1 0 1931

MORGAN ROLLING MILLS
ARE IDENTIFIED WITH THE WORLD'S
GREAT PROJECTS IN STEEL

Photos by Underwood & Underwood

The George Washington Memorial Bridge across the Hudson has a span of 3500 feet, nearly twice that of the next longest suspension bridge.

More than 107,000 miles of wire form the four great cables.

Each cable is made up of 26,474 wires divided into strands of 434 wires each.

In the rolling of the rods for these wires, John A. Roebling's Sons Co. employed their new Morgan continuous rod mill.

MORGAN CONSTRUCTION COMPANY, WORCESTER, MASS., U. S. A.

European Representatives — International Construction Company, 56 Kingsway, London, W. C. 2, England — Davy Brothers, Sheffield, England

MORGAN
WORCESTER
Engineers and Manufacturers

OV. 19
1931

Ten Thousand Sizes and Kinds of Steel Products —Ready to Ship

—Huge stores of steel and allied products that offer unusual possibilities for concentrating purchases and thus saving time, trouble and money. The diversity of stocks, the wide range of sizes carried, with prompt service assured, provides an economical source for those following the generally accepted buying methods.

There are ten Ryerson plants. Each plant is strategically located to serve its own industrial area. In every plant there is a strong, experienced organization with not only the desire, but the ability to serve.

You will find many advantages in grouping orders for immediate shipment from your nearest Ryerson Steel-Service plant.

PARTIAL LIST OF PRODUCTS ALWAYS IN STOCK

Bars	Turned, Ground and Polished Shafting	Babbitt Metal
Structurals	Strip Steel	Allegheny Metal
Rails	Rivets and Bolts	Alloy Steel
Plates	Boiler Tubes and Fittings	Tool Steel
Sheets, Blk. & Galv.	Welding Rods	Concrete Reinforcing
Sheets, Full Finished	Forging Bars	Firmtread Plates
Refined Iron		Small Tools, Machinery, etc.
Screw Stock		

JOSEPH T. RYERSON & SON, INC., Chicago, Milwaukee, St. Louis, Cincinnati, Detroit, Cleveland, Buffalo, Boston, Philadelphia, Jersey City

RYERSON STEEL-SERVICE

The "Key" to Immediate Steel—

Have you received a copy of the new Journal and Stock List?

The New Ryerson double indexed Stock List makes it much easier to turn to data on any steel line. If you have not received the October issue, mail this coupon and we will be glad to forward a copy.

Name .....

Firm .....

Street .....

City .....State .....

THE IRON AGE, published weekly by the *IRON AGE PUBLISHING CO.*, at 239 W. 39th St., New York, N. Y., U. S. A. Entered as second class matter, June 18, 1879, at the Post Office at New York under the Act of March 3, 1879. $6.00 a year in U. S.; Canada $8.50; Foreign $12.00. Nov. 19, 1931. Vol. 128, No. 21.

EDITORIAL INDEX

Machine Lapping Refrigerator Parts 1283
Modernizing Foundry with Conveyors 1286
Why Pay a Punctuality Bonus? 1292
Fabrication of Steel Cable Reels 1294
Dressing Sheet and Tin Mill Rolls 1297
Electronic Control of Machinery 1299
Book Reviews 1301
Emergency Maintenance of Equipment 1302
Machine Gas Cutting 1305
Wider Use of Bessemer Steel 1308
Dr. Haney's Page 1325

• •

New Equipment 1311
News 1317
Personals and Obituaries 1323
Editorials 1326
Markets 1329
Construction and Equipment Buying 1350

• •

THIS FIRM SOUGHT THE FACTS

A CERTAIN firm selling exclusively to the metal-working industry asked its customers, by questionnaire, which publications they preferred.

Like many other concerns which are becoming more critical of expenditures of all kinds, it sought the facts about advertising appeal where it could obtain them without bias.

The outstanding margin of preference expressed by this company's customers for THE IRON AGE gave it a clear picture of facts, completely divorced from argument or supposition. It showed unmistakably that THE IRON AGE should be used as the spearhead of its publicity efforts.

This case is not unique, nor are the results surprising, for many other concerns have found that customer-reader verdicts, which are final, are usually rendered decisively in favor of THE IRON AGE.

W. W. MACON, *Editor*
A. I. FINDLEY, *Editor Emeritus*
G. L. LACHER, *Managing Editor*
C. E. WRIGHT, *News Editor*

E. F. CONE
S. G. KOON
R. E. MILLER
G. S. HERRICK
F. L. PRENTISS *Cleveland*
R. A. FISKE *Chicago*
T. H. GERKEN *Pittsburgh*
BURNHAM FINNEY *Detroit*
L. W. MOFFETT *Washington*
GERARD FRAZAR *Boston*
R. G. McINTOSH *Cincinnati*

IRON AGE PUBLISHING CO.
239 West 39th Street
New York, N. Y.
Cable Address: "Ironage, N. Y."
F. J. FRANK, *President*
G. H. GRIFFITHS, *Secretary*
C. S. BAUR, *General Advertising Manager*
Division of
UNITED BUSINESS PUBLISHERS, INC.
New York, N. Y.

District Offices:
CHICAGO, Otis Building
PITTSBURGH, 1319 Park Building
CLEVELAND, 1362 Hanna Building
PHILADELPHIA, 45 Kent Road. Upper Darby.
DETROIT, 7338 Woodward Avenue
WASHINGTON, 536 Investment Bldg.
CINCINNATI, 402 Traction Building
BUFFALO, 847 Ellicott Square
BOSTON, Room 230, 80 Federal St.
SAN FRANCISCO, 742 Market Street and 1045 Sansome St.

Copyright, 1931, by
IRON AGE PUBLISHING CO.

Member, Audit Bureau of Circulations
Member, Associated Business Papers
Published every Thursday. Subscription Price; United States and Possessions, Mexico, Cuba, $6.00; Canada, $8.50, including duty; Foreign, $12.00 a year. Single Copy 25 Cents.

SPEED UP PRODUCTION

with SPIRAL BEVEL GEARS

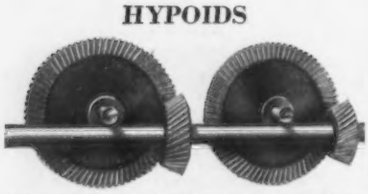
SPIRAL BEVELS should be used when redesigning or rebuilding old machines to obtain greater production. These Gears will operate at high peripheral speeds due to their overlapping tooth action and constant pitch line contact which eliminates the shock of transferring the load from tooth to tooth. They are being used with complete satisfaction in installations operating in excess of 6500 feet per minute.

Several teeth in mesh at one time allow a larger factor of safety, and other things being equal, the size of the installation can be reduced by using Spiral Bevel Gears.

The large number of new machines in which these gears are being used is evidence of their superior quality. Correctly generated Spiral Bevels, properly mounted and lubricated, will give years of trouble-free, satisfactory service.

Complete information on both Spiral Bevel and Hypoid Gears, and the machines on which they are cut, will be sent on request.

HYPOIDS



These gears, which possess all the advantages of Spiral Bevels, can be used in installations where the gear and pinion shafts are to pass. Hypoids are generated the same as Spiral Bevels except the pinion is cut in an offset position similar to that in which it is to be run.

GLEASON

GLEASON WORKS

Builders of Bevel Gear Machinery for Over Sixty Years

1000 UNIVERSITY AVENUE, ROCHESTER, N. Y., U. S. A.

THIS ISSUE IN BRIEF

Lapping on a Production Basis

Refrigerator parts, hardened and ground, are inserted between two cast iron laps. The lower lap rotates at 60 to 65 r.p.m. The upper lap is free-floating, non-rotating. From 0.0002 to 0.0004 in. of stock is lapped off.—Page 1283.

* * *

Preheating Reduces Hardness of Gas-Cut Heavy Steel Plate Edges

Formation of sorbite is lessened by preheating plate before cutting. Annealing the gas-cut material restores the original structure.—Page 1305.

* * *

Casting Costs Cut Sharply by Installation of Mold and Sand Conveying Equipment

Foundry modernization provides the same capacity in one-third the former floor space. The conveyor moves 30 ft., then stops 4½ min., during which time the molds are made, poured and shaken out.

* * *

A Bonus for Punctuality or a Penalty for Tardiness?

Additional payment made for punctuality constitutes an over-payment and is psychologically unsound. It makes the employee feel that he is not required to begin his work on time, but will be paid a reward if he does.—Page 1292.

* * *

All-Steel Cable Reels Are Supplanting Wood

No failures in 50,000 reels. Unlike wood, they cannot rot, and repair cost is low. The drum is formed on standard bending rolls, and the seam is closed on an electric welder. Heads are formed from sheets or plates. Spokes are formed channel sections. —Page 1294.

* * *

Can Roll Dressing Be Made an Exact Science?

Roll turning is at present an art, but if mill operators recognize the value of formulas, charts may be prepared which will enable the turner to read off on the chart that "cross" which will give him the required concavity.—Page 1297.

* * *

Future Inspector Will Be Electronically-Minded

Vacuum tubes make possible mechanical measurements of undreamed-of accuracy. Measurements can be made continuous, as in the case of wire and sheet, ringing alarms when limits are exceeded.—Page 1299.

"Doctor" to Broken Machinery Gets "Patient" Back Into Service Quickly

Delays of weeks may often be compressed into as many days by making welded repairs. Original alinement, contour and other features can be maintained.—Page 1302.

* * *

Is Bessemer Steel "Coming Back"?

Low-carbon steels of remarkable uniformity are easy to produce by Bessemer process. For many purposes well-made acid Bessemer steel cannot be surpassed. A limitation of the process is the high phosphorus in the steel and the small amount of scrap used.—Page 1309.

* * *

Checks Rapidly to Ten-Thousandth

Lapped parts are placed in electric gages which flash an amber light if the piece is within limits, a green light if undersize, and a red light if oversize.—Page 1284.

* * *

Adds Water to Molding Sand at Two Points

As it is not desirable to store tempered sand in too wet a condition, water is added before sand enters the mixer in modernized Westinghouse foundry, and again at the discharge end of the storage tank.—Page 1290.

* * *

Action of High-Speed Machinery May Be Studied with Stroboscope

Machine parts revolving at as high a speed as 1800 r.p.m. appear perfectly stationary when viewed through a new type of electrical stroboscope. Grid-glow tube flashes beams of light in perfect synchronism with the moving parts.—Page 1300.

* * *

Cracked Cinder Ladle "Stitched" by Welding

A hole is burned through the ladle at the extreme end of the crack. A steel plug is inserted, and its ends welded in place. Then holes are burned through, on either side of the crack, into which are inserted steel bars, bent into U-form and welded into the holes.—Page 1304.

* * *

Bessemer Steel Has Been Maligned, Says Metallurgist

Decrease in ductility, resulting in brittleness, is not directly proportional to the phosphorus content for all grades of steel, H. P. Tiemann declares. Any such effect is largely a function of the carbon content.—Page 1309.

●

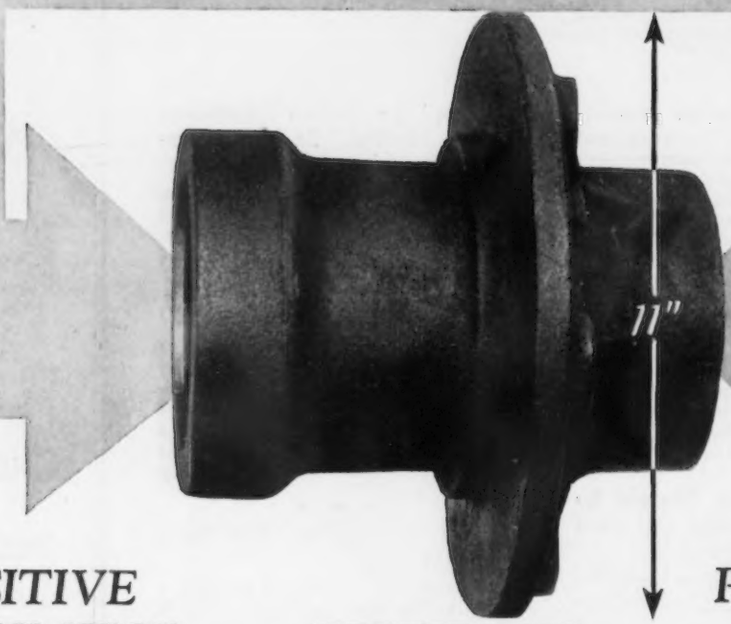
NEXT WEEK in THE IRON AGE

●

GRINDING of tungsten carbide, welding of oil cracking units, mass production of refrigerator parts and the effect of carbon and heat treatment on the wear resistance of steel are among the subjects that will be treated in our next issue. In addition to other articles of intimate interest to production men, there will be a timely discussion of the practical possibilities of voluntary cooperation as a means of stabilizing competition.

● ● ●

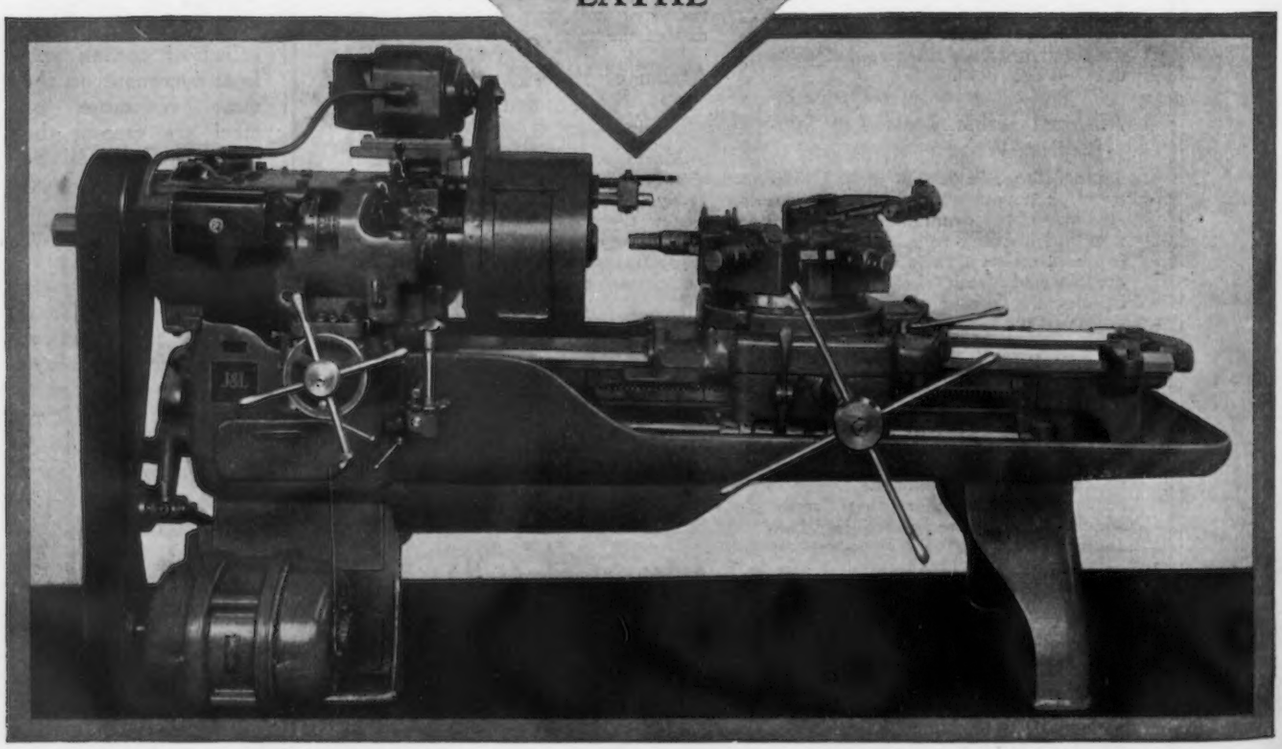
BOTH ENDS AT ONCE
Of Front Truck Hub



POSITIVE ALIGNMENT of Ball Bearing Seats

On the J & L FLAT TURRET LATHE

PRODUCTION 27 per hour Material: Malleable Iron



JONES & LAMSON MACHINE CO., Springfield, Vt.